PROJECT NO. FTEV 99-1015B-G
2007

DATE: 31December

DEPARTMENT OF THE AIR FORCE
SPECIAL OPERATIONS COMMAND
1 SPECIAL OPERATIONS WING

SPECIFICATIONS FOR:

REPLACE WATER MAINS AND VALVES PHASES B-G

HURLBURT FIELD, FLORIDA

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SECTION 01000: GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 INTENT:

A. The intent of this project is to provide the Government with a fully complete and useable building meeting all the requirements for it's intended use, constructed to high standards and the requirements of the Contract Documents. A fully complete and useable building is defined as one that is constructed to meet the aesthetic, functional and structural properties required by the drawings, specifications, amendments issued prior to receipt of bids/proposals, and modifications issued after award of the contract. All work shall be constructed to meet or exceed industry or government standards, whichever is more stringent. All construction shall be executed in a professional manner resulting in a finished product of highest quality. All materials, equipment, and other products used in the construction shall be new or approved recyclable materials from an approved source. All new work shall be maintained in a clean condition, and shall be installed plumb, square, true to line and grade, and shall conform to the stated dimensions, notes, schedules, etc. The work shall be properly secured, consistent in quality, fit and finish, and installation, etc.

1.02 APPLICABILITY:

A. This section of the specification is applicable to all sections that follow.

1.03 INTERPRETATION OF CONTRACT DOCUMENTS:

A. Prospective bidders desiring further information, interpretation or clarification of the contract documents shall forward a written request to the Contracting Officer. **The Contracting Officer is the sole authority for interpretation of intent of work and for approval of quality of materials and workmanship. Failure to request the above shall not be the basis for a change order. DO NOT ASSUME THAT YOUR INTERPRETATION IS CORRECT.**

1.04 CONFLICTS, DISCREPANCIES OR AMBIGUITIES:

A. Prior to submittal of a bid or proposal by the prime/general contractor, it is expected that each subcontractor, equipment and/or material supplier, and others associated with the project, shall have carefully examined as necessary, the drawings, specifications, and all addenda issued prior to the date of submission of the bid or proposal. Any and all conflicts, discrepancies or ambiguous language reasonably ascertainable from an inspection of the above and the project site that will affect the cost, quality, fit, finish, labor specified or required, equipment and/or materials specified or required, etc., necessary to **fully complete the project and make it operational for it's intended use, must immediately be brought to the attention of the prime/general contractor. The prime/general contractor must immediately notify the Contracting Officer in writing prior to submitting a bid or proposal and request written clarification of the conflict and/or discrepancy.**

B. Conflicts, discrepancies and ambiguous language that is inconsistent with the intent as stated above include but are not limited to:
   1. Ambiguous notes or statements or drawings or details.
   2. Conflicting information on the drawings and/or in the specifications.
   3. Errors or inconsistencies in schedules.
   4. Dimensional errors.
   5. Incomplete notes or dimensions or schedules.
   6. Extraneous notes, dimensions or schedules that conflict with the drawings or specifications.

C. **Conflicts, discrepancies or ambiguities brought to the attention of the Contracting Officer AFTER award of contract WILL NOT be considered as a basis for a change in the work.**

D. The intent of the above paragraphs is to increase the involvement of all persons associated with the project, particularly during the bid or proposal phase. Increased involvement during this phase will enhance the accuracy of the bid or proposal and reduce the potential for issuance of change orders during the construction phase.

1.05 DEFINITIONS:

A. **"Contract Documents":** Contract Documents consist of the Contract, drawings and specifications, all addenda issued prior to submission of the bid/proposal and all modifications and/or other directives issued after the award/execution of the contract. The intent of the Contract Documents is to provide the Contractor with all items of work necessary for the proper execution and completion of the project. The items listed are complementary, what is required by one shall be as binding as if required by all. In the

event of a conflict between the drawings and the specifications, the specifications shall take precedence over the drawings, **unless** otherwise noted on the drawings. The Contractor shall perform all work consistent with and reasonably inferable from the Contract Documents as necessary to produce the intended results.

B. **"Government"**: The government is the United States of America. The government is the owner of the project.

C. **"Prime Contractor"**: The Prime/General Contractor is the person or entity who is qualified, bonded and insured, and who is responsible for preparing the bid/proposal and submitting it to the government. If the bid/proposal is accepted, the prime contractor will enter into a contract with the government to construct the work in accordance with the Contract Documents. The term "contractor" is used throughout the contract documents, and is synonymous with Prime/General Contractor, and means the contractor or the contractor's authorized representative.

D. **"Subcontractor"**: A Subcontractor is a person or entity who prepares and submits a bid/proposal for a portion of the work to the contractor for his use in preparing his bid/proposal. During the construction phase, the subcontractor has a direct contract with the contractor to perform a portion of the work.

E. **"Material/Equipment Suppliers"**: Material/equipment suppliers are person(s) or entities who prepare and submit a bid/proposal to the contractor for his use in preparing his bid/proposal. During the construction phase, the material equipment supplier has a direct contract with the contractor to provide certain materials or equipment to be incorporated into the work.

F. **"Project"**: The project is the total construction of the work to be performed under the contract documents and may be the whole or part and which may include construction by the government.

G. **"Work"**: The term work means the providing of construction services required by the contract documents, and includes all labor, materials, equipment and other incidentals necessary to fulfill the contractor's obligations. The work constitutes the whole project.

H. **"Changes in the Work"**: Changes in the work may be accomplished after award of contract without invalidating the contract. Changes in the work shall be based upon a mutual agreement between the contractor and the government. Changes in the work shall be performed under applicable provisions of the contract documents unless otherwise provided for in the change. The time to complete the additional work shall also be a part of the agreement.

1.06 COORDINATION:

A. **The prime contractor is responsible for the overall coordination of the project during both the bid and or the proposal phase and the construction phase.**

1. Coordinate **bid and or the proposal phase** to assure that all materials, labor, equipment, etc., to be used in the construction of the project and necessary for the completion of the prime contractor's bid/proposal, as defined in 1.01 above, are included in the bids of the respective suppliers and/or subcontractors work, i.e., civil, architectural, plumbing, HVAC, or electrical.
2. Coordinate **construction phase** to assure efficient and orderly progression of the work. Coordination shall include, but is not limited to, periodic meetings between the contractor and subcontractors to coordinate the work of each trade one with the other, installation of one part of the work that is dependent on the installation of other components either before or after it's own installation, the materials and equipment needed to properly complete the work and ordering of those materials and equipment, preparation of schedules, layouts and phasing of the work as required to meet the government's stated needs, installation of and removal of temporary facilities, preparation and delivery of submittals including shop drawings, manufacturer's product data, etc., scheduling of construction activities in the sequence required to obtain the best results, installation of different components within the allotted space to assure maximum accessibility for required maintenance or repair, periodic inspections of the work to assure compliance with the Contract Documents, visual inspections of the work to assure compliance with aesthetic requirements, maintenance and completion of all contract closeout documents including the coordination of supporting closeout documents by all subcontractors, maintenance and completion of Construction Data Worksheet, verification of new utility connections to each item of existing and new equipment, verify measurements of existing and new work prior to installation of various components, proper storage of materials at the site particularly items requiring specific environmental conditions, protection of completed new work to minimize damage by other trades, cleaning, correction of punch list items of work after the final inspection, correction of warranty items during the warranty period, etc.
3. The prime contractor, each subcontractor, each equipment or material supplier and others who may

be affiliated with the project are individually responsible for field verification of existing and new conditions that will affect their work, including the work of associated trades. Do not order, fabricate or install new items without field verification. Any discrepancy between the actual field dimension(s) and the size shown on the drawings, specifications, shop drawings, manufacturer's product data, etc. must immediately be brought to the attention of the prime contractor, project inspector and Contracting Officer. The prime contractor shall request written direction from the Contracting Officer.

4. Prior to performing any Site work or work below grade, the Contractor must obtain a completed and signed copy of AF FORM 103, Base Civil Engineering Work Clearance Request.

B. Individual sections of this specification are taken from the Base Master Specification. Therefore, not all products (materials, equipment, etc.) specified may be required to complete the construction of this project. In accordance with 1.05 above, the contractor, each subcontractor, equipment and/or material supplier, and others associated with the project, must carefully examine the drawings to determine which products are required to fully complete the work. See paragraph 1.04 Discrepancies.

1.07 CONSTRUCTION DATA WORKSHEET

A. The contractor must complete the checklist attached at the end of this section.
   1. Section 1.a. General Data Required: The government will complete Category Code and Facility number.
   2. Section 1.b. Systems in Building: All.
   3. Section 2. Specialized Buildings: All.

1.08 METHODS:

A. The site shall be prepared, maintained, and operated by the contractor throughout the Work. Such preparation, maintenance, and operation includes but is not limited to:
   1. Preparation: Prevent damage to all existing and new items such as stored material, existing utilities and structures, vegetation, and privately owned vehicles in and around the work site. The contractor responsible for the damage will be held liable for the repair or replacement of the damaged item as directed by the Contracting Officer.
   2. Maintenance: Maintain the site in a neat and orderly manner to include daily trash/debris removal, stacking of material, control of surface drainage, mowing, and road sweeping.
   3. Operation: Follow Occupational Safety and Health Administration requirements, US Army Corps of Engineers Safety and Health Requirements Manual EM 385-1-1, base law enforcement and base fire marshal requirements.
   4. Trailers used for storage and/or temporary field offices shall be clean and well maintained and display only the name of the contractor or subcontractor.

1.09 CONSTRUCTION:

A. All work will be of professional quality. Intent of construction includes but is not limited to the following:
   1. Utility connections shall be clean and complete. Contractor must request a utility outage from the Contracting Officer no less than 3 working days prior to a scheduled outage for a single facility, and 14 days for outages affecting multiple facilities.
   2. Backfilling and compaction will be performed so settling shall not occur.
   3. All disturbed areas and all new graded areas shall be graded smooth and sodded. Seeding will be permitted only if indicated on the drawings and/or approved by the Contracting Officer. Also, see other applicable sections(s) of the specification.
   4. Construction shall be built to minimum industry tolerances unless otherwise noted and shall be square, true to line and grade, plumb and straight. Construct to the dimensions and elevations given on the drawings.
   5. Finishes shall be consistent in color and texture, and shall cover all exposed surfaces, including obscure surfaces.
   6. All work shall be constructed and/or installed in strict accordance with the manufacturer's written instructions, copies of which must be included with submittal documents.
   7. **Road/pavement cuts are not permitted** unless approved by the Contracting Officer. If approved, road/pavement cuts must be submitted to the 16th Civil Engineering Squadron, Engineering Flight (16CES/CEC) in writing, two weeks prior to the scheduled road/pavement cut.
   8. Under no circumstances will a utility outage or road cut be permitted without the required notification unless the Base Civil Engineer deems it an emergency.
   9. Any contractor that connects to a Hurlburt Field fire hydrant for water usage must use an approved backflow preventer and provide proof to the 16CES/CEV (Environmental Flight) through the Contracting Officer that they are using a certified backflow prevention device. The certificate must be current to within 12 months of the date of connection and through the duration of water usage. Certification must be by a Certified Backflow Tester certified by the State.

1.10 CONSTRUCTION STANDARDS:

A. This project shall be constructed to conform to the latest edition of the following standards.
   1. ASTM: American Society for Testing and Materials
   2. ACI: American Concrete Institute
   3. International Code Council, 2003 edition
      a. International Building Code
      b. International Fuel Gas Code
      c. International Mechanical Code
      d. International Plumbing Code
      e. NFPA: National Fire Protection Association.
      f. NEC: National Electric Code
      g. Unified Facilities Criteria (UFC) UFC 4-010-01 dated 8 October 2003, DoD Minimum Antiterrorism Standards for Buildings.
      h. Unified Facilities Criteria (UFC) UFC 3-600-01dated 17 April 2003 with change 16 January 2004, Fire Protection Engineering for Facilities.
      i. Americans with Disabilities Act
      j. ASCE 7-98
      k. 16TH Civil Engineer Squadron Design & Construction Standards. (Copy in 16 CES Engineering Flight office)

B. The contractor is required to comply with all aspects of the Federal Aviation Regulation (FAR), Part 77, **Objects Affecting Navigable Airspace**, for all work associated with this contract. This includes, but is not limited to, the use of any and all equipment used to construct the facility and the facility itself. The contractor is required to obtain **all necessary permits including FAA form 7460-1 (latest edition) and provide all necessary notices** associated with this requirement. All work within the following areas must be coordinated in writing with the Contracting Officer 21 days in advance of commencement of the work:
   1. LATERAL CLEARANCE AREA: A line 1000 feet from and parallel to the centerline of the runway.
   2. TAXIWAY SETBACK: A line 200 feet from and parallel to the centerline of any taxiway.
   3. APRON SETBACK: A line 125 feet from and parallel to the edge of the aircraft-parking apron.
   4. CLEAR ZONE: A line 1500 feet from and parallel to the centerline of the runway beginning at the runway threshold and continuing for a distance of 3000 feet north and south of the ends of the runway.

C. A copy of FAR Part 77, and permit applications may be obtained from:
   ARP Division ASO-600
   Federal Aviation Administration
   P. O. Box 20636
   Atlanta, Georgia 30320
   Phone 404-3056700

1.11 SUBSTITUTIONS:

A. Throughout these specifications and/or on the drawings one or more **"Trade Names"** for a product may be listed. When this occurs, all parties agree that the phrases: **"or equal," "or approved equal," and "or equal as approved,"** follow each **"Trade Name"** listed. The contractor may submit substitute products, meeting the identified salient characteristics (physical and functional), to the Contracting Officer for review and approval. The term "Trade Names" includes Acceptable Manufacturers listed under PART 2 PRODUCTS of the specifications.

B. Approval Required:
   1. The Contract is based on the standards of quality established in the Contract Documents.
   2. All products proposed for use, including those specified by required attributes and performance shall require approval by the Contracting Officer before being incorporated into the work.
   3. **Do not substitute materials, equipment, or methods unless such substitution has been specifically reviewed and approved for this Contract by the Contracting Officer.**
   4. Refer to section 01600 for substitution submittal requirements.

C. **Do not assume that materials, equipment or methods submitted, as a substitution, will be approved as equal. The Contracting Officer is the sole interpreter of the Contract Documents.**

1.12 ASBESTOS:

A. See section 01560, Environmental Protection

1.13 LEAD BASED PAINT

A. See section 01560, Environmental Protection

1.14 HAZARDOUS MATERIALS AND WASTE

A. See section 01560, Environmental Protection

1.15 CONTRACT PROGRESS REPORT

A. Contractor progress reports shall be made in a timely manner and in accordance with the contract documents.

B. Contractor shall use the Contract Progress Report form at the end of this section. As indicated on the form, all listed items of work may not be applicable to this project. Contractor shall submit completed form to include only those items of work applicable to this project.

C. Item 73, "Close-Out Documents" has been assigned a value of 3%. This amount will be withheld from final payment until such time as all project record documents (including "As-Built" drawings), operation & maintenance data, spare parts & maintenance products, warranties, maintenance service, etc., have been turned over to the government. The contractor and subcontractors are advised to prepare these documents as the work progresses and not wait until the end of the project. **These documents must be turned over to the government prior to the final inspection.** The withholding of payment is not a penalty but is being done to assure compliance with specification Section 01700 CONTRACT CLOSEOUT.

1.16 CONTRACT PROGRESS SCHEDULE

A. The contractor must provide a copy of the Contract Progress Schedule for review by the Contracting Officer and the Construction Manager at the Pre-Construction Conference. If disapproved, the contractor shall resubmit the revised Contract Progress Schedule within 2 days of the date of the disapproval. The Contract Progress Schedule must be approved within 10 days of the date of the disapproval. **No construction work shall start without an approved Contract Progress Schedule.**

B. The Contract Progress Schedule must be based on the data in the Contract Progress Report attached to the end of the section.

C. In order to satisfy the contract requirements that work commence within 10 days of Notice to Proceed, the contractor may commence the submittal process in accordance with Section 01300.

1.17 CONTRACTOR COMPLIANCE STATEMENT

A. Prior to final payment, the prime contractor must provide the Contracting Officer with a dated written statement, executed by the owner(s) of the firm and witnessed by two persons, that the project was completed in accordance with the contract documents as defined above. Additionally, both the signatures of the owner and the two witnesses must be notarized simultaneously.

B. The statement must be in the following form:

"I (we), the owners of (insert firm name, see definitions "Prime Contractor") firm, having entered into a contract with the government to construct (insert contract number and project title) do hereby certify that the project was completed in accordance with the contract documents as defined above. Beneficial occupancy by the government was on (insert date)."

_____ _____
Owner (If more than one add lines Date

_____ _____
Witness Date

_____ _____
Witness Date

_____ _____
Notary Date Notary Seal/Stamp

PART 2 NOT USED

PART 3 NOT USED

END OF SECTION

CONSTRUCTION DATA WORKSHEET

1. GENERAL DATA REQUIRED:

A. PROJECT INFORMATION:

Project No.: _____, Contract No.: _____, Completion Date: _____
Category Code: _____, Facility No.: _____, Total Cost: _____
Liquidated Damages_____. Number of Floors: _____
General Description: _____

B. SYSTEMS IN BUILDING:

(1) Fire Protection:

Category Code	Unit of Nomenclature	Measure	Amount	Cost	Description (If Required)
880-211	Closed Head Auto Sprinkler	EA			
880-212	Open Head Deluge System	EA			
880-217	AFFF PA Sprink Sys	SF			
		EA			
880-221	Auto Fire Detection System (Include Pull Stations)	SF			
880-222	Manual Fire Alarm System (Int)	EA			
880-223	Manual Fire Alarm System (Ext)	BX			
880-231	CO2 Fire System	EA			
880-232	Foam Fire System	EA			
880-233	Other Fire System	EA			

(2) Security:

Category Code	Unit of Nomenclature	Measure	Amount	Cost	Description (If Reqd.)
872-841	Security Alarm System	EA			

(3) Mechanical Systems:

Category Code	Unit of Nomenclature	Measure	Amount	Cost	Description (If Reqd.)
811-147	Electric Emergency Power Generator	KW			
	Storage Tank for Heating Or Generator Fuel (Type Fuel)	GA			
	Storage Tank for Heating	GA			
821-113	Htg Fir Cen Plt	SF			
821-115	Heating Plt 750/3500 MB	MB			
821-116	Heating Plt over 3500 MB	MB			
	Storage Tank for Heating	GA			
890-121	A/C Plt 5 to 25 TN	TN			
826-122	A/C Plt 25 to 100 TN	TN			
826-123	A/C Plt Over 100 TN	TN			
890-126	A/C Window Units	TN			
824-464	Gas Mains	LF			
844-368	Water Supply, Non-Potable	KG			
852-261	Veh. Parking (Ops)	SY			
852-262	Veh. Parking (Non-Org)	SY			
132-133	Pad, Equip	SY			
132-134	Ant. Spt Stru	EA			
890-272	EMCS Field Equip	EA			

C. RELATED FACILITIES:

Category Code	Nomenclature	UM	Amount	Cost	Description (If Reqd.)

812-223	Prim Dist Line OH	LF			
	Transformers	KV			
812-224	Sec Dist Line OH	LF			
812-225	Prim Dist Line UG	LF			
812-226	Sec Dist Line UG	LF			
812-926	Exterior Lighting	EA			
	(Street or Parking area Lights)				
812-928	Traffic Lights	EA			
831-157	Industrial Waste Fuel Spill Collection (Oil/Fuel)	KG			
831-169	Sewage Septic Tank	KG			
	(Facility # it Supports)				
832-266	Sanitary Sewer	LF			
832-267	Sanitary Sewage Pump Station	SF			
841-166	Water Well	EA			
842-245	Water Dist Mains	LF			
842-246	Water Hydrants	EA			
843-314	Fire Protection Water Main	LF			
843-315	Fire Hydrants	EA			
851-143	Curbs & Gutters	SY			
	(Transition between Road & Parking lot)				
851-147	Road	SY			
871-183	Storm Drain Disposal	LF			
872-245	Fence, Boundary	LF			
872-247	Fence, Security	LF			
872-248	Fence, Interior	LF			
852-289	Sidewalk	SY			
890-187	Utility Vault	SF			
890-269	Cathodic Protection Sys	EA			
890-181	Utility Line Duct	LF			
135-583	Tel Duct Facility	LF			
135-586	Tel Pole Facility	LF			

2. Specialized Buildings:

135-583	Tel Duct Facility	LF			
890-158	Load and Unload Platform	EA			
832-255	Industrial Waste Main	LF			
890-144	Compressed Air Dist	LF			
	HP of Unit				
890-134	Compressor Air Plt	HP			
890-154	Load & Unload G-Crane	EA			
890-171	Misc. Storage Tank	BL			

This checklist includes only the basic general construction category codes. More detailed category code listing information is available through the Real Property office, 884-6167.

CONTRACT PROGRESS REPORT

CONTRACTOR		ADDRESS	
REPORT NO.	PERIOD COVERED FROM TO	PROJECT NO. / TITLE	
CONTRACT AMOUNT $		CONTRACT NO.	COMPLETION DATE

NOTE:
ALL ITEMS LISTED MAY NOT BE APPLICABLE TO THIS PROJECT. CONTRACTOR SHALL SUBMIT COMPLETED FORM TO INCLUDE ONLY THOSE ITEMS THAT ARE APPLICABLE TO THIS PROJECT.

LINE NO.	WORK ELEMENTS	% OF TOTAL JOB	% COMPLETED THIS PERIOD	% COMPLETE CUMULATIVE
1	MOBILIZATION			
2	DEMOLITION - ARCHITECTURAL			
3	ASBESTOS / LEAD ABATEMENT			
4	SITE PREPARATION			
5	SITE UTILITIES			
6	SITE IRRIGATION SYSTEM			
7	SITE FINISH GRADING			
8	SITE LANDSCAPING			
9	ASPHALT PAVING / BASE			
10	CONCRETE CURB / GUTTER			
11	CONCRETE BUILDING SLAB / VAPOR BARRIER			
12	CONCRETE WALKS / LANDINGS			
13	CONCRETE FOOTINGS			
14	CONCRETE BEAMS / COLUMNS			
15	MASONRY FOUNDATIONS			
16	MASONRY SCREENWALLS			
17	MASONRY VENEER			
18	STRUCTURAL STEEL			
19	MISCELLANEOUS METALS / HANDRAILS / GRATES			
20	WOOD AND PLASTICS			
21	WALL INSULATION			
22	ROOF INSULATION			
23	EIFS			
24	WINDOWS			
25	EXTERIOR DOORS			
26	STOREFRONT			
27	OVERHEAD COILING DOORS			
28	INTERIOR DOORS			
29	HARDWARE			
30	EXTERIOR METAL STUDWALLS / SHEATHING			
31	INTERIOR METAL STUDWALLS / SHEATHING			
32	PAINTING			
33	WALL COVERING			
34	TOILET ACCESSORIES			
35	TOILET PARTITIONS / URINAL SCREEN			
36	SIGNAGE			
37	RAISED ACCESS FLOOR			
LINE NO.	WORK ELEMENTS	% OF TOTAL	% THIS PERIOD	% CUMULATIVE

38	PRE-ENGINEERED METAL BUILDING (PEMB)			
39	PEMB ROOF / FASCIA			
41	ELEVATORS / CONVEYING SYSTEMS			
42	DEMOLITION - MECHANICAL / PLUMBING			
43	NEW WATER / SEWER / NATURAL GAS SERVICE			
44	PLUMBING ROUGH-IN UNDER SLAB			
45	HVAC ROUGH-IN UNDER SLAB			
46	PLUMBING ROUGH-IN ABOVE SLAB			
47	PLUMBING FIXTURE / TRIM-OUT			
48	COMPRESSED AIR SYSTEM			
49	PIPE AND DUCT INSULATION			
50	DUCTWORK			
51	HYDRONIC PIPING			
52	FIRE SUPPRESSION			
53	HVAC EQUIPMENT			
54	GRILLES / DIFFUSERS/ TRIM-OUT			
55	CONTROLS			
56	TEST AND BALANCE			
57	DEMOLITION - ELECTRICAL			
58	ELECTRIC SERVICE TEMPORARY			
59	TRANSFORMER			
60	PRIMARY OVERHEAD ELECTRIC SERVICE			
61	PRIMARY UNDERGROUND ELECTRIC SERVICE			
62	SECONDARY OH ELECTRIC SERVICE			
63	SECONDARY UG ELECTRIC SERVICE			
64	ELECTRIC ROUGH-IN			
65	COMM / LAN ROUGH-IN			
66	FIRE DETECTION ROUGH-IN			
67	FIRE DETECTION EQUIPMENT / TRIM-OUT			
68	COMM / LAN TRIM-OUT			
69	ELECTRIC FIXTURES / TRIM-OUT			
70	EXTERIOR LIGHTING			
71	BONDING			
72	DEMOBILIZATION			
73	CLOSE-OUT DOCUMENTS	3%		
	TOTAL			
	SCHEDULED AMOUNT THIS BILLING			
	TOTAL BID AMOUNT: SCHEDULED:		ACTUAL:	

INSPECTOR SIGNATURE: CONCUR NOT CONCUR (CIRCLE)

PROGRESS OR COMPLETION CERTIFICATE

I HEREBY CERTIFY THAT THE CONTRACTOR HAS SATISFACTORILY COMPLETED THE INDICATED PERCENTAGE OF THE CONTRACT SPECIFICATIONS

SUBMITTED BY OR FOR

CONTRACTOR: BASE CIVIL ENGINEER:

TYPE OR PRINT NAME AND TITLE	SIGNATURE	DATE

REVIEWED BY OR FOR CONTRACTING OFFICER

TYPE OR PRINT NAME AND TITLE	SIGNATURE	DATE

SECTION 01010: SUMMARY OF WORK

PART 1 GENERAL

1.01 RELATED SPECIFICATION SECTIONS:
A. Section 01000 – GENERAL REQUIREMENTS.

1.02 WORK INCLUDED:
A. The contractor shall furnish all labor, materials, tools, supervision and equipment and perform all operations necessary to accomplish all work complete in place.

1.03 JOB DESCRIPTION:
A. The work to be performed includes, but is not necessarily limited to, the following principal features:

1. Install erosion control devices
2. Install water mains, tees, valves, hydrants and fittings
3. Test installed water facilities
4. Connect existing service lines to new water mains
5. Restore disturbed areas

1.04 CONTRACTOR USE OF SITE AND PREMISES
A. Limit use of site to allow Owner visitation and inspection.
B. The contractor and subcontractors are permitted to use existing utilities available at the site. Use is subject to approval by the Contracting Officer. The 16 Civil Engineering Squadron must approve all connections. Connection to existing water mains must utilize a backflow preventer, certified within the 12 months prior to use on base.

1.05 DISPOSAL
A. All scrap materials and debris shall be disposed of in an on- site dumpster. When full, it shall be emptied at a legally approved dumpsite off- base. It shall be the responsibility of the contractor to provide the dumpster and for the selection of the dumpsite. Provide Contracting Officer with name(s) of waste disposal company and approved dumpsite.

1.06 STORAGE AREA
A. Contractor lay-down/materials storage site shall be as shown on the drawings or as approved by the Contracting Officer.
B. A minimum of a 6 foot high temporary visual barrier shall surround the area.
C. The area must be maintained in a reasonably clean manner. All empty boxes, paper and trash must be deposited in the on-site construction dumpster.

1.07 SAFETY
A. The pertinent sections of the following publications are applicable to all work on this project.
   1. U.S. Army Corps of Engineers: EM 385-1-1, Safety and Health Requirements Manual.
   2. Air Force Instruction (AFI) 91-301.

1.08 HAUL ROUTE AND LITTER
A. The Contractor shall utilize only the designated haul route for the project for access to and from the site as shown on the Drawings.

1.09 USE OF BARGE AREA

A. Use of the barge off loading area is not allowed except as approved, in writing, by the Contracting Officer. Contractor must request usage of the barge site, in writing, to the Contracting Officer a minimum of 30 days prior to expected deliveries. Contractor must also submit a schedule of all deliveries. Under no circumstances should the contractor assume such requests will be approved. Contractor should plan to have materials delivered by other means.
B. If usage of the barge site is approved, the contractor must meet the following requirements:
   1. Crane boom height cannot exceed eighty (80) feet from mean water elevation.
   2. Crane boom must have a red flag and an operational blinking obstruction light.
   3. Contractor will be responsible for surrounding water quality per the State of Florida Regulations. Prior to delivery of any barge/crane or tug, contractor must install full-depth turbidity barriers both east and west of the site to extend beyond limits of off loading operations.

4. Off loading operations will be during daylight hours only. Operations will not start before 0700 (7:00 AM) and boom must be lowered to deck height by 1700 hours (5:00 PM) each day.
5. Contractor is required to provide the name and number of a responsible party, and contact information of the tug/crane operator at site to **both** of the following:
   a. The Contracting Officer.
   b. Hurlburt Tower: Hurlburt Tower – 884-4795. (If tower cannot be contacted notify the Airfield Manager – Mr Bob Baker, 884-4491, Cell 598-1543).
6. Upon notification of inclement weather, off loading operations must cease and the boom lowered to deck height. Do not raise boom until cleared by the Hurlburt Tower. All barges and equipment must be secured. Upon notification of Hurcon conditions, the contractor must remove all barges, cranes, tugs, and associated equipment from the site. The government will not be responsible for any delays or costs associated to weather.
7. If notified to do so by the Contracting Officer or Hurlburt Tower, operations must cease and the boom lowered to deck height. Under no circumstances should the boom be raised until cleared by the notifying authority. The government will not be responsible for any associated delays or costs.

C. If these requirements cannot be met, the contractor is prohibited from using the barge site. Failure to adhere to these requirements during operations will result in immediate revocation of site use at no expense to the government. Site must be maintained per specifications and contractor will be responsible for any and all clean-up after operations.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTIONS

3.01 INSPECTION

A. The contractor shall accomplish work in an orderly progression of steps to satisfy the performance requirements of this specification.

3.02 HOURS OF WORK

A. The normal hours of a workday shall be between 7:00 A.M. and 4:00 P.M., Monday through Friday, excepting holidays and observed holidays. The contractor may elect, at his option, to work hours other than normal duty hours if approved by the Contracting Officer. All work time, other than normal working days, shall be requested in writing, 3 days in advance.

3.03 PHOTOGRAPHS

A. The contractor will take before and after photographs of the work. "Before" photos will be submitted before the start of work. "After" photos will be submitted before the acceptance of the work. 24 photos of each will be required. Photos must show exterior and interior areas of the building that are to receive the new work. The intent is to show the amount of change. Photos may be submitted by the Air Force for design and construction awards. All photos taken shall be submitted in the form of 35-mm slides.

3.04 QUALITY CONTROL

A. The contractor shall establish and maintain quality control to assure compliance with Contract Documents, and maintain records of his quality control for materials, equipment and construction operations.

3.05 CONSTRUCTION LAYOUT & VERIFICATION:

A. The contractor shall employ a Florida Registered Land Surveyor to layout the building and other site features in accordance with the drawings. Potential problems that will affect the site geometry shall immediately be brought to the attention of the Contracting Officer.

B. Horizontal and Vertical Control shall conform to Hurlburt Field Datum: Horizontal NAD-83; Vertical NAVD-88.

C. Upon completion of the project and prior to the submission of the "As-Built" drawings (See Section 01700 Contract Closeout), the contractor shall employ a Florida Registered Land Surveyor to perform the following Horizontal Control by use of Global Positioning Satellite (GPS) to sub-meter accuracy:

1. Location of installed valves, hydrants, plugs, reducers, water mains and service lines.

3.06 WARRANTY INSPECTION

A. A warranty inspection will be held thirty (30) days prior to the expiration of the contractor's one-year warranty. The inspection will be held at the project site. Those in attendance shall include the contractor, the Contracting Officer, the project inspector, and the occupant. The purpose of this inspection will be to

identify current or re-occurring problems associated with the project and past warranty calls and corrective action taken to remedy them. The contractor shall contact the Contracting Officer to determine the date of the inspection. The Contracting Officer shall contact the appropriate government agencies and confirm the date the inspection is to take place.

B. A list of problems identified at the inspection will be provided to all those in attendance. All problems must be corrected to the satisfaction of the government prior to the expiration of the warranty

END OF SECTION

SECTION 01090 REFERENCE STANDARDS

PART 1 - GENERAL

1.01 RELATED SPECIFICATION SECTIONS:

A. Section 01000 - GENERAL REQUIREMENTS

1.02 section include

A. Applicability of Reference Standards.

B. Provision of Reference Standards at site.

C. Source and acronyms used for Reference Standards in Contract Documents.

1.02 APPLICABILITY OF REFERENCE STANDARDS

A. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. The publications listed in the various specification sections form a part of the specification to the extent referenced. The publications are referred to in the text by basic designation only.

C. Use the latest standard, except when a specific date is specified.

D. Disregard payment provisions contained in any portion of the referenced specifications and standards.

E. If the specified reference standard(s) conflicts with the Contract Documents, request clarification from the Contracting Officer before proceeding.

1.03 PROVISION OF REFERENCE STANDARDS AT SITE

A. When required by individual specifications sections, obtain a copy of the standard. Maintain a copy at the jobsite during submittals, planning, and progress of the specific work until completion.

1.04 ABBREVIATIONS & NAMES

A. Where acronyms or abbreviations are used in the specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, and authority having jurisdiction or other entity applicable. Refer to "Encyclopedia of Associations" published by Gale Research Co., available in most libraries.

1.04 SOURCE FOR REFERENCE STANDARDS

AASHTO American Association of State Highway and Transportation Officials
444 N. Capital St., NW, Suite 249
Washington, DC 20001

ACI American Concrete Institute
P.O. Box 19150
Detroit, MI 48219

ACPA American Concrete Pipe Association
8300 Boone Blvd., #400
Vienna, VA 22182

ANSI American National Standards Institute
11 West 42nd St.
New York, NY 10036

ASNT American Society for Non-destructive Testing
4153 Arlingate Plaza

Columbus, OH 43228-0518

ASTM American Society for Testing and Materials
1916 Race Street
Philadelphia, PA 19103

AWS American Welding Society
P.O. Box 351040
Miami, FL 33135

AWWA American Water Works Association
6666 West Quincy
Denver, CO 80235

CFR Code of Federal Regulations
Order from:
Superintendent of Documents
Government Printing Office
Washington, DC 20402-9371

CRSI Concrete Reinforcing Steel Institute
933 No. Plum Grove Rd.
Schaumburg, IL 60173-4758

CS United States Department of Commerce Standard
Order from:
National Technical Information Service
5285 Port Royal Rd.
Springfield, VA 22161

FAA Federal Aviation Administration
Department of Transportation
Order from:
Superintendent of Documents
Government Printing Office
Washington, DC 20402-9371
For documents offered at no cost, order from:
Dept. of Transportation
ATTN: M443.2
400 Seventh St., SW
Washington, DC 20590

FS Federal Specifications
Order from:
Standardization Documents Order Desk
Bldg 4, Section D
700 Robbins Ave.
Philadelphia, PA 19111-5094

FTM-STD Federal Test Method Standards
Order from:
Standardization Documents Order Desk
Bldg 4, Section D
700 Robbins Ave.
Philadelphia, PA 19111-5094

MS Military Specifications (MILSPEC)
Standardization Documents Order Desk
Bldg 4, Section D
700 Robbins Ave.
Philadelphia, PA 19111-5094

MSS Manufacturers' Standardization Society of the Valve and Fittings Industry
127 Park St., NE
Vienna, VA 22180

NBS National Bureau of Standards
(U. S. Department of Commerce)
Gaithersburg, MD 20234

OSHA Occupational Safety and Health Administration
(U.S. Department of Labor)
Order from:
Superintendent of Documents
Government Printing Office
Washington, DC 20402-9371

PART 2 - PRODUCTS: NOT USED.

PART 3 - EXECUTION: NOT USED.

END OF SECTION

SECTION 01300: SUBMITTALS

PART I GENERAL

1.01 RELATED SPECIFICATION SECTIONS:

A. Section 01000 – GENERAL REQUIREMENTS

1.02 WORK INCLUDED:

A. Throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined by manufacturer's name and catalog number, reference to recognized industry and Government standards, or description of required attributes and performance.

B. Make all submittals required by the Contract Documents in a timely manner to allow construction of the building within the allotted performance time.
   1. Long lead items such as pre-engineered metal building systems, electrical and mechanical systems, special equipment, etc. must be submitted within 15 days of Notice to Proceed.
   2. All submittals must be made within 45 days of Notice to Proceed.
   3. **Late submittals that result in delayed delivery of materials and equipment, which will affect the completion and acceptance of the building by the government, will not be a justification for a time extension.**
   4. Revise, submit and/or resubmit (submittals) as necessary to establish compliance with the specified requirements.

1.03 QUALITY ASSURANCE:

A. Coordination of Submittals: Prior to each submittal, carefully review and coordinate all aspects of each item being submitted and verify that each item and the submittal for it conforms in all respects with the requirements of the Contract Documents. **By affixing his signature to each submittal, the contractor certifies that this coordination and verification has been performed.**

B. Certificates of Compliance:
   1. Certify that all materials used in the work comply with all specified provisions thereof. Certification shall not be construed as relieving the contractor from furnishing satisfactory materials if, after tests are performed on selected samples' the material is found to not meet specific requirements.
   2. Show on each certification the name and location of the work, name and address of contractor, quantity and date or dates of shipment or delivery to which the certificate applies, and name of the manufacturing or fabricating company. An officer of the manufacturing or fabrication company shall sign certificates.
   3. In addition to the above information, all laboratory test reports submitted with Certificates of Compliance shall show the date or dates of testing, the specified requirements for which testing was performed, and results of the test or tests.

PART 2 PRODUCTS

2.01 SHOP Drawings AND COORDINATION Drawings:

A. Shop Drawings: Make all shop Drawings accurately to a scale sufficiently large to show all pertinent aspects of the item and its method of connection to the work.

2.02 MANUFACTURER'S LITERATURE:

A. Where contents of submitted literature from manufacturers includes data not pertinent to the submittal, clearly indicate which portion of the contents is being submitted for review.

PART 3 EXECUTION

3.01 IDENTIFICATION OF SUBMITTALS:

A. General: Consecutively number all submittals.

B. Internal Identifications: On at least the first page of each copy of each submittal and elsewhere as required for positive identification, clearly indicate the submittal number in which the item was included.

C. Indicate FTEV Number, Project Title and Contract Number

3.02 COORDINATION OF SUBMITTALS:

A. **General:** Prior to submittal for approval, use all means necessary to fully coordinate all material including, but not necessarily limited to:
   1. Determine and verify all interface conditions, catalog numbers and similar data.
   2. Coordinate with other trades as required.
   3. Clearly indicate all deviations from requirements of the Contract Documents.

B. **Grouping of submittals:** Unless otherwise specified, make all submittals in groups containing all associated items to ensure that information is available for checking each item when it is received. Partial submittals will be rejected as not complying with the provisions of the Contract Documents and the contractor shall be strictly liable for all delays so occasioned.

C. **Interior Finish Materials/Colors/Samples:** All interior finish materials/colors/samples, includlng but not limited to, flooring, base, paint/stain, wall coverings, acoustic ceiling/suspension system, acoustical treatment, window treatment, laminated plastic for base/wall cabinets/countertops, interior signage, etc., shall be submitted as a group **(one submittal)** to allow the government to review/approve/disapprove and select/coordinate the interior finish materials/colors prior to being incorporated into the work. Upon receipt of the government's approved selections, the contractor shall provide the government with actual samples of each item for the record, minimum size 4"x4", except laminate plastic chips shall be manufacturer's standard size.

D. **Exterior Finish Materials/Colors/Samples:** All exterior finish materials/colors/samples, including but not limited to, brick, concrete masonry, exterior insulation finish system, stucco, paint/stain, roofing/flashing, exterior signage, pavers, windows, doors, etc., shall be submitted as a group (one submittal) to allow the government to review/approve/disapprove and /select/coordinate the exterior finish materials/colors prior to being incorporated into the work. Upon receipt of the government's approved selections, the contractor shall provide the government with actual samples of each item for the record, minimum size 4"x4".

3.03 SUBMITTAL APPROVAL:

A. **General:** Approval by the Contracting Officer shall not be construed as a complete check, but only that the general method of construction and detailing is satisfactory. **Review and approval by government shall not relieve the contractor from responsibility for errors that may exist, or from liability for failure to comply with the intent of the Contract Documents.**

B. **Revisions After Approval:** When a submittal has been approved, a re-submittal by the contractor for the purpose of substitution of materials or equipment, will not be considered unless accompanied by an acceptable explanation as to why the substitution is necessary.

C. **Unnecessary Submissions:** When the contractor elects to provide the materials, equipment, etc., that was used as the basis for the design and is the exact: Manufacture's name, catalog number, size, and finish as shown in the drawings or specified herein, no submittal is required. The contractor however shall submit a letter to the Contracting Officer stating that he will use the specified product. All field-testing associated with the material or equipment, etc. must be performed and submitted to the Contracting Officer for approval.

3.04 SCHEDULE OF MATERIAL SUBMITTALS.

A. Assign numbers to these items to be submitted, beginning with the number 1 and continuing through the last submittal. Items that are disapproved and require resubmittal shall be numbered with the original submittal number followed by R1 if the first resubmittal of the item, R2 if the second resubmittal, and so on, until final approval is given.

END OF SECTION

SECTION 01410: TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 RELATED SPECIFICATION SECTIONS:
A. Section 01000 – GENERAL REQUIREMENTS

1.02 REFERENCES:
A. ANSI/ASTM D3740 - Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as used in Engineering Design and Construction.

B. ANSI/ASTM E329 - Recommended Practice for Inspection and Testing Agencies for Concrete, Steel and Bituminous Materials as Used in Construction.

1.03 SELECTION AND PAYMENT:
A. Contractor shall employ and pay for services of an independent testing laboratory to perform specified inspection and testing.

B. The Government will employ and pay for services of an independent testing laboratory to perform inspection and testing deemed to be in the best interest of the Government. The contractor will be responsible for the cost of all inspections, testing and replacement of Work not meeting the Contract Documents.

C. Employment of testing laboratory shall in no way relieve contractor of obligation to perform Work in accordance with requirements of Contract Documents.

1.04 QUALITY ASSURANCE:
A. Comply with requirements of ANSI/ASTM E329 and ANSI/ASTM D3740.

B. Laboratory: Licensed and authorized to operate in State of Florida.

C. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards (NBS) or accepted values of natural physical constants.

D. Certification: Current Certification by Construction Materials Council, Inc.

1.05 CONTRACTOR SUBMITTALS:
A. Prior to start of Work, submit testing laboratory name, address and telephone number, and the name or names of the Professional Engineer(s), currently registered in the state of Florida, who will be certifying the reports or tests and a responsible officer of the company

B. Submit copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards (NBS) during most recent tour of inspection, with memorandum of remedies of any deficiencies reported by the inspection.

1.06 LABORATORY RESPONSIBILITIES:
A. Provide qualified personnel at site.

B. Perform specified inspection, sampling, making cylinders, etc., and testing of all products in accordance with Contract Documents.

C. Ascertain compliance of materials and mixes with requirements of Contract Documents.

D. Provide certified copies of the reports or tests as per 1.07 below. The Professional Engineer shall affix his name and date to all reports or tests before affixing his impression seal over both.

1.07 LABORATORY REPORTS:
A. **After each inspection and test and prior to providing copies to the contractor, the Testing Laboratory shall promptly forward one (1) copy of each laboratory report directly to the Contracting Officer for record purposes. Mail to Contracting Officer, 16 CONS/LGCB, 350 Tully St., Hurlburt Field, FL 32544.**

B. Contractor shall submit four (4) copies of each laboratory report as per Section 01300 to the Contracting Officer for review and approval.

C. Include:
1. Date issued.
2. Project title and number.
3. Name of inspector.
4. Date and time of sampling or inspection.
5. Identification of product and specifications section.
6. Location in the project.
7. Type of inspection or test.
8. Date of test.
9. Results of test.
10. Conformance with Contract Documents.

D. When requested by Contracting Officer, provide interpretation of test results.

1.08 LIMITS ON TESTING LABORATORY AUTHORITY:

A. Laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

B. Laboratory may not approve or accept any portion of the Work.

C. Laboratory may not assume any duties of the contractor.

D. Laboratory has no authority to stop the Work.

1.09 CONTRACTOR RESPONSIBILITIES:

A. Notify laboratory of the location of the construction site and samples of materials proposed to be used, which require testing.

B. Provide laboratory all proposed mix designs.

B. Cooperate with laboratory personnel and provide access to the Work, to manufacturer's literature and other pertinent data.

C. Provide incidental labor and facilities to provide access to Work to be tested, to obtain and handle samples at the site or at source of products to be tested, to facilitate tests and inspections, storage and curing of test samples.

D. Notify laboratory a minimum of 24 hours prior to expected time for operations requiring inspection, sampling, and testing services.

PART 2 PRODUCTS (NOT USED)

PART 3 PRODUCTS (NOT USED)

END OF SECTION

SECTION 01540: GREEN PROCUREMENT

PART 1 GENERAL

1.01 RELATED SPECIFICATION SECTIONS:

A. Section 01000 – GENERAL REQUIREMENTS

1.02 GREEN PROCUREMENT & POLLUTION PREVENTION

A. Green Procurement is a mandatory component of the Air Force pollution prevention program. The AF Installation Pollution Prevention Program Guide includes this goal for Green Procurement: "100% of all products purchased each year in each of U.S. EPA's 'Guideline Item' categories shall contain recycled materials meeting U.S. EPA's Guideline Criteria."

B. Currently, reporting of green procurement purchases is limited to contracts having a total value greater than $100,000.00, which includes the purchase of any amount of U.S. EPA-designated items.

C. This document contains guidelines for implementing the RCRA, EO, DOD, and Air Force requirements

1.03 AUTHORITY & REFERENCES:

A. The Resource Conservation and Recovery Act (RCRA), section 6002 (42 U.S.C. 6962)

B. Executive Order (EO) 13101, Greening the Government through Waste Prevention, Recycling, and Federal Acquisition.

C. Title 40, Code of Federal Regulations (CFR), Part 247, Comprehensive Procurement Guideline for Products containing Recovered Material.

D. Federal Acquisition Regulations (FAR)

1.04 REGULATORY BACKGROUND

A. Section 6002 of RCRA requires federal agencies to give preference in the acquisition process to products and practices that conserve and protect natural resources and the environment. EO 13101 requires federal agencies to expand waste prevention and recycling programs, implement affirmative procurement programs for the United States Environmental Protection Agency (EPA) -designated items, and procure other environmentally preferable products and services. The stated purpose of the Green Procurement Program is to stimulate the market for recovered materials. As a result of EO 13101, the EPA issued the Comprehensive Procurement Guidelines (CPG's) that have established the mandatory procurement by federal agencies of 36 items produced with recovered materials. The EPA has also issued Recovered Material Advisor Notices (RMANs) to accompany the CPGs and provide detailed information on the designated items.

B. Please direct all questions regarding the plan to the Contracting Officer for forwarding to the 16CES/CEV Environmental Flight, 8844651.

1.05 DOD AND AIR FORCE REQUIREMENTS

A. Green Procurement programs are required of all Air Force (USAF) installations. Department of Defense (DOD) Instruction 4715.4, Pollution Prevention, calls for program establishment in accordance with RCRA and EO 12873. Green Procurement is also addressed in Air Force Instruction (AFI) 32-7080, Pollution Prevention Program, and the 24 July 1995 Air Force Pollution Prevention Strategy. The Strategy sets program goals, and the AFI provides program guidance.

1.06 SUBMITTALS

A. Submit under provisions of Sections 01000, 01300 and 01600.

B. Each contractor as defined in paragraph 1.09 Definitions must complete the form attached at the end of this section, indicating which products containing recycled or recovered products are going to be incorporated in the construction of this project. In accordance with paragraph 1.10 Exemptions, provide which exemption is applicable to each listed product.

C. Product Data: Submit manufacturer's material specifications, installation instructions, physical characteristics,

D. Manufacturer's Certificate: Certify that products meet or exceed the specified requirements.

E. Sample: Submit sample for record.

1.07 RECYCLED OR RECOVERED PRODUCTS

A. Those construction materials identified on the Form at the end of this section.

1.08 QUALITY ASSURANCE

A. Manufacturer: Companies specializing in the manufacture of products that comply with the requirements of this section with a minimum of three (3) years documented experience.

1.09 DEFINITIONS:

A. GREEN PROCUREMENT: The purchase of environmentally preferable products manufactured from recycled and reclaimed materials.

B. ACQUISITION: The acquiring by contract with appropriated funds for supplies or services (including construction) by and for the use of the Federal Government through purchase or lease, whether the supplies or services are already in existence or must be created, developed, demonstrated, and evaluated. Acquisition begins at the point when agency needs are established and includes the description of requirements to satisfy agency needs, solicitation and selection of sources, award of contracts, contract financing, contract performance, contract administration, and those technical and management functions directly related to the process of fulfilling agency needs by contract.

C. CONTRACTOR (S): The prime contractor, subcontractors, material suppliers, and equipment suppliers who provide the products that will be used in the construction of this project.

D. ENVIRONMENTALLY PREFERABLE: Products or services having a lesser or reduced effect on human health and the environment when compared to competing products or services, serving the same purpose. This comparison may consider raw materials acquisition, production, manufacturing, packing, distribution, reuse, operation, maintenance, or product or service disposal. (EO 13101)

E. EPA DESIGNATED ITEM: An item that is or can be made with recovered material; that is listed by the Environmental Protection Agency (EPA) in a procurement guideline (40CFR, part 427); and for which EPA has advised purchasing recommendations in a related Recovered materials Advisory Notice (RMAN). (FAR 23.402)

F. EXECUTIVE AGENCY OR AGENCY: An executive agency as defined in 5 U.S.C. 105. For the purpose of this order, military departments, as defined in 5 U.S.C. 102 are covered under the auspices of the Department of Defense.

G. FORM: The Affirmative Procurement Reporting Form found at the end of this section.

H. POLLUTION PREVENTION: Source reduction as defined in the Pollution Prevention Act of 1990 (42 U.S.C. 13102), and other practices that reduce or eliminate the creation of pollutants through (a) increased efficiency in the use of raw materials, energy, water, or other resources; or (b) protection of natural resources by conservation.

I. PRODUCT: Materials and equipment that will be used in the construction of this project.

J. POSTCONSUMER MATERIAL: A material or finished product that has served its intended use and has been discarded for disposal or recovery, having completed its life as a consumer item. "Postconsumer material" is a part of the broader category of "recovered material".

K. PROCUREMENT: The purchase and providing of products to be used in the construction of this project.

L. RECOVERED MATERIALS: Waste materials and by-products which have been recovered or diverted from solid waste, but such term does not include those materials and by-products generated from, and commonly reused within, an original manufacturing process. (EO 13101, 42 U.S.C. 6903 (19) and FAR 23.402)

M. RECYCLABILITY: The ability of a product or material to be recovered from or otherwise diverted from the solid waste stream for the purpose of recycling. (EO 13101)

N. RECYCLING: The series of activities, including collection, separation, and processing by which products or other materials are recovered from the solid waste steam for use in form of raw materials in the manufacture of new products other than fuel for producing heat or power by combustion. (EO 13101)

O. RECYCLED MATERIAL: A material utilized in place of raw or virgin material in product manufacturing consisting of materials derived from postconsumer waste, industrial scrap, materila derivived from agricultureal wastes, and other items, all of which can be used in new product manufacturer. (EPA Guidelines & OFPP Policy Letter 92-4)

P. RECYCLED PRODUCT: A recycled product is one made completely or partially from waste materials or by-products recovered or diverted from the solid waste stream.

Q. SOLID WASTE: Garbage, refuse, sludges and other discarded materials including those from industrial, commercial, and agricultural operations, and from community activities. This excludes solids or dissolved materials in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial waste water effluents, dissolved materials in irrigation return flow, etc. (EPA Guidelines)

R. SPECIFICATION (S): A clear and accurate description of the technical requirements for materials, products, or services including the minimum requirement for materials' quality and construction and any equipment necessary for an acceptable product. In general, specifications are in the form of written descriptions, drawings, prints, commercial designations, industry standards, and other descriptive references.

S. UNREASONABLE PRICE: If the cost of the recycled content product exceeds the cost of a non-recycled item, the Air Force considers the cost to be unreasonable. (Air Force Affirmative Procurement Plan)

T. VERIFICATION: Procedures used by procuring agencies to confirm both vendor estimates and certifications of the percentages of recovered materials contained in the products supplied to them or to be used in the performance of a contract. (EPA Guidelines)

U. WASTE PREVENTION: Any change in the design, manufacturing, purchase, or use of materials or products (including packaging) to reduce their amount or toxicity before they are discarded. Waste prevention also refers to the reuse of products or materials.

V. WASTE REDUCTION: Preventing or decreasing the amount of waste being generated through waste prevention, recycling, or purchasing recycled and environmentally preferable products.

1.10 EXEMPTIONS

A. U.S. EPA recommends minimum content levels for those items listed at paragraph 1.11. The minimum content levels are indicated in the Form. These levels are **mandatory** for Air Force procurements **unless one of the following exemptions applies.** RCRA provides the following exemptions from the requirement to purchase EPA-designated items:

1. The product is not available from a sufficient number of sources to maintain a satisfactory level of competition (i.e., available from two or more sources).

2. The product is not available within a reasonable period of time.

3 The product does not meet the performance standards in applicable specifications or fails to meet reasonable performance standards of the procuring agency.

4. The product is not available at a reasonable price. For Air Force purposes, "unreasonable price" is defined as follows: If the price of the recycled-content product exceeds the cost of a non-recycled item, then the price is considered unreasonable.

B. Each contractor is responsible for completion of the Form with respect to his or her work and products being provided. Each contractor shall provide written documentation to support his/her decision not to

acquire items meeting the minimum content levels. This documentation shall be forwarded to the Contracting Officer for review and approval. In the event the documentation fails to support the contractor's findings, the Contracting Officer shall return the documentation to the contractor citing the reason(s) for disapproval. The contractor shall resubmit and address the deficiencies.

1.11 U.S. EPA-DESIGNATED ITEMS

A. The 54 U.S. EPA-designated items are listed below. **Not all of these items and the products listed under each item may be required in the construction of this project. Please refer to the drawings and specifications.** The executed Form shall be used to demonstrate compliance with the stated procurement requirements.

1. PAPER PRODUCTS
   - Item 1: All paper and paper products, excluding building and construction paper grades.

2. VEHICULAR PRODUCTS
   - Item 2: Lubricating oils containing re-refined oil, including engine lubricating oils, hydraulic fluids, and gear oils, but excluding marine and aviation oils.
   - Item 3: Tires, excluding airplane tires.
   - Item 4: Reclaimed engine coolants, excluding coolants used in non-vehicular applications

3. CONSTRUCTION PRODUCTS
   - Item 5: Building insulation products.
   - Item 6: Structural fiberboard products for applications other than building insulation.
   - Item 7: Laminated paperboard products for applications other than building insulation.
   - Item 8: Cement and concrete, including products such as pipe and block, containing fly ash.
   - Item 9: Cement and concrete, including concrete products such as pipe and block, containing ground-granulated blast furnace (GGBF) slag.
   - Item 10: Carpet made of polyester fiber for use in low- and medium-wear applications.
   - Item 11: Floor tiles containing recovered rubber or plastic.
   - Item 12: Patio blocks containing recovered rubber or plastic.
   - Item 25: Shower and restroom dividers/partitions containing recovered steel or plastic.
   - Item 26: Reprocessed and consolidated latex paint for specific uses.
   - Item 37: Carpet cushion
   - Item 38: Flowable fill.
   - Item 39: Railroad grade crossing surfaces.

4. TRANSPORTATION PRODUCTS
   - Item 13: Traffic barricades used in controlling or restricting vehicular traffic.
   - Item 14: Traffic cones used in controlling or restricting vehicular traffic.
   - Item 27: Parking stops.
   - Item 28: Channelizers used as temporary traffic control devices.
   - Item 29: Delineators used as temporary traffic control devices.
   - Item 30: Flexible delineators used as temporary traffic control devices.

5. PARK AND RECREATION PRODUCTS
   - Item 15: Playground surfaces containing recovered rubber or plastic.
   - Item 16: Running tracks containing recovered rubber or plastic.
   - Item 31: Plastic fencing.
   - Item 40: Park benches and picnic tables.
   - Item 41: Playground equipment.

6. LANDSCAPING PRODUCTS
   - Item 17: Hydraulic mulch products containing recovered paper or recovered wood.
   - Item 18: Compost made from yard trimmings, leaves, and/or grass clippings.
   - Item 32: Garden and soaker hoses containing recovered rubber or plastic.
   - Item 33: Lawn and garden edging containing recovered rubber or plastic.
   - Item 42: Food waste compost.
   - Item 43: Plastic lumber landscaping timbers and posts.

7. NON-PAPER OFFICE PRODUCTS
   - Item 19: Office recycling containers.
   - Item 20: Office waste receptacles.

Item 16: Plastic desktop accessories.
Item 22: Toner cartridges.
Item 23: Binders.
Item 24: Plastic trash bags.
Item 34: Printer ribbons (re-inked ribbons or re-inking equipment/service for ribbons).
Item 35: Plastic envelops.
Item 44: Solid plastic binders.
Item 45: Plastic clipboards.
Item 46: Plastic file folders.
Item 47: Plastic clip portfolios.
Item 48: Plastic presentation folders.

8. MISCELLANEOUS PRODUCTS
Item 36: Pallets
Item 49: Sorbents.
Item 50: Industrial drums.
Item 51: Awards and plaques.
Item 52: Mats
Item 53: Signage, including supports and posts.
Item 54: Manual grade strapping.

1.12 APPLICABILITY

A. These procedures apply to all contractors employed in the construction of this project.

B. Please direct all questions regarding the plan to the Contracting Officer for forwarding to the 16CES/CEV Environmental Flight, 8844651.

1.13 INTENT

A. The intent of this section is to increase the awareness of all contractors as to the availability of products manufactured from or that contain recycled materials, thereby increasing the use of these products in the construction of this project.

B. The various sections of the specifications contain references to products to be used in the construction of this project. The listed product **may or may not** be manufactured from or contain recycled materials. **Therefore all contractor(s), subcontractors, equipment suppliers and material suppliers are responsible for compliance with this specification, particularly paragraph 1.09 and those items/products listed on the Form. Recycled products shall be used wherever possible subject to the exemptions as per paragraph 1.09.**

C. Substitution of recycled materials or recycled products for specified products are subject to the provisions of paragraph 1.05 Submittals (above) and Section 01000, paragraph 1.09.

PART II PRODUCTS

2.01 PARTIAL LIST OF PRODUCT SOURCES & INFORMATION

A. GENERAL DATA:
1. GreenSpec Binder, Environmental Building News, www.ebuild.com
2. Certified Forest Products Council, www.cerifiedwood.org/
3. Wiley Series in Sustainable Design, www.wiley.com/
4. The Carpet and Rug Institute, www.carpet-rug.com/
5. Information, McGraw-Hill, dialogue@mcgraw-hill.com
6. Florida Directory of Recycled Product Vendors, www.2.dep.state.fl.us/waste/programs/rbac/downloads/rbac_dir.pd
7. Oikos Green Building Source, News, searchable products data base, library, www.oikos.com
8. Green Design Network, News, publications, databases, www.greendesign.net
9. Green Works Recycled Content7 Product Guide, detailed vendors directory, www.metrokc.gov/greenworks/recycontent.htm>

B. DIVISION 03, CONCRETE

1. GranCem, granulated blast-furnace slag, www.grancem.com/
2. Syndesis, cement-based, pre-cast product workable with wood tools, www.syndesisinc.com/

C. DIVISION 04, MASONRY
1. Heble Building Systems, autoclaved aerated concrete blocks, www.heble.com/
2 Ytong Florida Ltd., autoclaved aerated concrete blocks, www.ytong-usa.com/

D. DIVISION 06, WOOD & PLASTICS
1. Avonite, solid surfacing, www.avonite.com/
2. Chemical Specialties, wood treatment, www.treatedwood.com/
3. Homasote Company, structural fiberboard, www.homasote.com/
4. Isoboard, fiberboard composed of straw fibers and non-toxic resins, www.isoboard.com/
5. TrusJoist Mac Millan, engineered wood products, www.homasote.com/

E. DIVISION 07, Thermal & Moisture Protection
1. Duro-Last Roofing, recycled PVC walkway pads, 1-800-2480280
2. Johns Manville, Insulation products, www.jm.com/
3. Majestic Skylines, rubber-based slate-look roofing for steep roofs, www.majesticskylines.com/
4. Owens-Corning, insulation products, www.owenscorning.com/

F. DIVISION 08, DOORS & WINDOWS
1. Marvin Window & Door, windows, some meeting "Energy Star Label", www.marvin.com/
2. Pella, energy efficient windows, www/pella.com/

G. DIVISION 09, FINISHES
1. Armstrong World Industries, Inc.-Flooring Systems, www.armstrong-floors.com/
2. Armstrong World Industries, Inc.-Ceiling Systems, www.ceilings.com/
3. Benjamin Moore & Co., VOC free acrylic interior latex paint, www.benjaminmoore.com/
4. CanFibre Group Ltd., all-green medium-density fiberboard, www.canfibre.com
5. Chemrex Inc., low-e interior paint, www.chemrex.com/
6. Collins & Aikman Floor coverings, carpet with 100% post-consumer backing, www.powerbond.com/
7. DesignTex, Inc., polyester panel fabric made from 100% PET fiber, www.dtex.com/
8. Dodge-Regupol, Inc., 100% recycled rubber-flooring, www.regupol.com/
9. Eco-sensitive modular tile, vinyl tile with 100% recycled carpet-backing, www.powerbond.com/
10. Environmental Stone Products, stone manufactured from 100% recycled glass, www.environmentalstone.com/
11. Glidden: residential interior latex paints 100% free of VOC, www.icipaintstores.com/
12 Homasote Inc., sound barrier, www.homasote.com/
13. Isoboard Enterprises, Inc. panel made from wheat straw and non-toxic resins, 1-503-2427345
14. Marley-Flexco Co., flooring made form 95% recycled truck and bus tires, www.marleyflexco.com/
15. The Mat Factory, Inc., interlocking roll-up tiles made from 100% postconsumer tire rubber and PVC plastic
from electric cable covers, 1-949-6453122
16. Permafirm Pad Co., carpet pads made from almost 100% recycled content, 1-800-3446977
17. Sherwin Williams, VOC compliant paints and enamels, www.sherwin.com/
18. SierraPine Limited, formaldehyde-free particleboard and medium density fiberboard containing recycled/recovered wood fiber, www.sierrapine.com/
19. Summittville Tiles, impervious porcelain tiles using feldspar tailings, www.summitville.com/
20 Tectum, natural-fiber acoustical ceiling and wall panels, www.tectum.com/
21. Tiles with natural fibers, tiles made of a bio-alloy material and natural fibers, www.maderatile.com
22. USG Interiors, Inc., synthetic gypsum board, www.usg.com/
23. Decorative Architectural Tiles, floor, counter & wall tile made from 100 % postconsumer glass, 1-808-8857812
24. Forbo, linoleum-flooring utilizing renewable resources, www.forbo.com/

H. DIVISION 10, SPECIALTIES
   1. The Access Store, modular ramping system made from 100% recycled rubber, www.accessstoe.com/
   2. BP Solar, photovoltaic modules and systems, www.bp.com/bpsolar/index
   3. Mecho Shade Systems, interior shadecloths, www.mechoshade.com/
   4. R Control, structural insulated panel (SIP), www.mechoshade.com/

I. DIVISION 12, FURNISHINGS
   1. Guilford of Maine, fabric from 100% recycled materials, www.terratex.com/
   2. Phenix Biocomposites, tabletops made from soy based products free of petrochemicals, 1-800-3248187
   3. Safe Solutions, LLC, furniture manufactured from waste wood, 1-970-2473333

J. DIVISION 14, CONVEYING SYSTEMS
   1. Montgomery KONE, AC girlies elevators, www.montgomery-kone.com/

K. DIVISION 16, ELECTRICAL
   1. Advance Transformer Company, linear reactor ballast, www.advancetransformer.com/
   2. Artemide Inc., energy efficient cold-cathode lighting, www.artemide.com/
   3. Edison Price Lighting, track mounted metal-halide PAR 30 &38 lamps, 1-212-5216995
   4. Leviton Manufacturing Corporation, Inc., occupancy sensors, www.leviton.com/
   5. Phillips Lighting, energy efficient compact fluorescent lamps, www.phillips.com/lighting
   6 Osram Sylvania, mercury-free lamps and energy efficient fluorescent lamps, www.osramsylvania.com/
   7. Sensor Switch, lighting control occupancy sensors, www.sensorswitch.com/
   8. Venture Lighting, pulse-start high performance lamp and ballast system, www.venturelighting.com/

PART III EXECUTION

3.01 INSTALLATION

A. Install materials and systems in accordance with manufacturer's written instructions and approved submittals. Install materials and systems in proper relation to adjacent construction and with uniform appearance.

B. Coordinate with work of other sections.

C. Restore damaged finishes and test for proper function.

D. Clean and protect work from damage.

END OF SECTION

GREEN PROCUREMENT REPORTING FORM
(PER EXECUTIVE ORDER 13101)

PROJECT NUMBER:_____
BLDG NUMBER:_____
PROJECT MANAGER_____
PROJECT INSPECTOR:_____
CONTRACTOR:_____
This form is to be completed by the Contractor and submitted through 16 CONS to 16 CEC. It is the responsibility of the 16 Civil Engineering Squadron construction inspector to submit this data to 16 Civil Engineering Squadron's Environmental Flight (CEV) who in-turn reports it to AFSOC MAJCOM IAW E.O. 13101, Federal Acquisition, Recycling, and Waste Prevention.

RECYCLED OR RECOVERED PRODUCT	% REQUIRED (MINIMUM)	% AVAIL (ACTUAL)	QUANTITY USED/UI	EXEMPTED 1,2,3,4
-ROCK WOOL INSUL	75%			
-FIBERGLASS INSUL	20-25%			
-LOOSE FILL/SPRAY ON INSUL	75%			
-PERLITE COMP BOARD INSUL	23%			
-PLASTIC RIGID FOAM INSUL	9%			
-GLASS FIBER REINF FOAM INSUL	6%			
-PHENOLIC RIGID FOAM INSUL	5%			
-STRUCTURAL FIBER BD	80-100%			
-LAMINATED PAPER BD	100%			
-CEMENT/CONCRETE (FLYASH)	SEE SPEC			
-CARPET (PET)	25-100%			
-PATIO BLOCKS/RUBBER	90-100%			
-PATIO BLOCKS/PLASTIC	90-100%			
-FLOOR TILES/RUBBER	90-100%			
-FLOOR TILES/PLASTIC	90-100%			
-TRAFFIC CONES	50-100%			
-TRAFFIC BARRICADES	80-100%			
-PLAYGROUND SURFACES	90-100%			
-RUNNING TRACKS	90-100%			
-COMPOST	100%			
-WOOD-BASED HYDRAULIC MULCH	100%			
-PAPER-BASED HYDRAULIC MULCH	100%			
REPROCESSED LATEX PAINT WHITE, OFF-WHITE & PASTEL COLORS	20%			
REPROCESSED LATEX PAINT GREY, BROWN, EARTHTONES & OTHER DARK COLORS	50-99%			
CONSOLIDATED LATEX PAINT	100%			
PLASTIC/RUBBER PARKING STOPS	100%			
CONCRETE CONTAINING COAL FLY ASH PARKING STOPS	20-40%			
CONCRETE CONTAINING GGBF PARKING STOPS	25-70%			
PLASTIC SHOWER & RESTROOM DIVIDERS/PARTITIONS	20-100%			

CERTIFICATION

I hereby certify the Statement of Work/Specifications for the requisition/procurement of all materials listed on this form comply with EPA standards for recycled/recovered materials content.

_____	_____	_____
Contractor	Inspector	Environmental Flight

The following exemptions may apply to the non-procurement of recycled/recovered content materials:

1) The product does not meet appropriate performance standards
2) The product is not available within a reasonable time frame
3) The product is not available competitively (from two or more sources)
4) The product is only available at an unreasonable price (compared with a comparable non-recycled content product.)

SECTION 01560 ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.01 RELATED SPECIFICATION SECTIONS
A. Section 01000 - GENERAL REQUIREMENTS

1.02 SECTION INCLUDES
A. The environmental protection required for this contract.

1.03 REFERENCES
A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1. **CODE OF FEDERAL REGULATIONS (CFR)**
   a. 29 CFR 1910.1200, Hazard Communication Standard
   b. 40 CFR 61, Subpart M. National Emission Standard for Asbestos
   c. 40 CFR 110, Discharge of Oil
   d. 40 CFR 112, Oil Pollution Prevention and Response
   e. 40 CFR 122, Municipal Separate Storm Sewer Systems, Phase I & II
   f. 40 CFR 125, Criteria and Standards for the National Pollutant Discharge Elimination System (NPDES)
   g. 40 CFR 260-271, Resource Conservation and Recovery Act (RCRA)
   h. 40 CFR 260-279, Hazardous Waste and Used Oil Management
   i. 40 CFR 300, National Contingency Plan
   j. 40 CFR 355, Extremely Hazardous Substances
   k. 40 CFR 403, General Pretreatment Regulations for Existing and New Sources of Pollution
   l. 49 CFR 171-172, General Information, Regulations and Definitions, and Hazardous Waste Materials Tables

2. **ENVIRONMENTAL PROTECTION AGENCY (EPA)**
   EPA PL 96-510, Comprehensive Environmental Response Compensation and Liability Act of 1980

3. **FLORIDA ADMINISTRATIVE CODE (FAC)**
   a. FAC 62-25, Regulation of Stormwater Discharge
   b. FAC 62-150, Hazardous Substance Release Notification
   c. FAC 62-210, Stationary Sources – General Requirements
   d. FAC 62-212, Stationary Sources – Pre-construction Review
   e. FAC 62-257, Florida Asbestos Rule
   f. FAC 62-555, Permitting and Construction of Public Water Systems
   g. FAC 62-604, Collection Systems and Transmission Facilities
   h. FAC 62-621, Generic Permits
   i. FAC 62-730, Hazardous and Solid Waste Amendments (HSWA) to RCRA
   j. FAC 62-737, Management of Spent Mercury Containing Lamps and Devices for Recycling
   k. FAC 62-762, Aboveground Storage Tank Systems
   l. FAC 62-770, Petroleum Contamination Site Cleanup Criteria

4. **HURLBURT FIELD INSTRUCTIONS AND DIRECTIVES**
   a. Hurlburt Field Directive for Mercury and Fluorescent Lamps
   b. Hurlburt Field Ozone Depleting Substance Management Plan
   c. Hurlburt Field Spill Prevention Control and Countermeasure (SPCC) Plan
   d. Hurlburt Field Installation Restoration Program (IRP) Management Action Plan
   e. Hurlburt Field Hazardous Waste Management Plan
   f. Hurlburt Field Hazardous Materials Management Plan
   g. Hurlburt Field Integrated Solid Waste Management Plan
   h. Hurlburt Field Recycling Program
   i. Hurlburt Field Asbestos Management Plan
   j. Hurlburt Field Green Procurement Program Plan
   k. Hurlburt Field Lead Based Paint and Lead Hazard Abatement Plan

5. **USAF INSTRUCTION**
   a. AFI 32-7044, Storage Tank Compliance
   b. AFI 32-7086, Hazardous Material Management

1.04 QUALITY ASSURANCE

A. Contractor shall establish and maintain quality control for environmental protection of all items set forth herein. The Contractor shall record on daily reports any problems in complying with laws, regulations, permit requirements, ordinances, and corrective action taken. The Contractor shall immediately inform the Contracting Officer of any environmental problem.

B. The Prime Contractor will have the sole responsibility to ensure all their subcontractors comply with all environmental protection requirements of this specification section.

1.05 CONTRACTOR COMPLIANCE

A. **Permits**: The contractor shall ensure that required environmental permits are obtained prior to start of construction and/or installing or operating any new or modified equipment or processes or disturbing or clearing any land area. Based upon information provided by the contractor, 16 CES/CEV will determine when permits are required. Where environmental permits are thought to be required, the contractor shall coordinate with 16 CES/CEV, prepare any required technical documentation for the permit application, and submit to 16 CES/CEV. 16 CES/CEV will sign and forward applications to the appropriate regulatory authority. The contractor shall be responsible for operating within permit limits and abiding by all permit conditions. 16 CES/CEV shall be notified immediately of any instance that exceeds the limits of the permit or a violation of permit conditions. The contractor shall immediately notify 16 CES/CEV of any unforeseen environmental conditions, which may conflict with approved permits. Any certifications required by permits shall be the responsibility of the contractor. Copies of all permits and certifications shall be submitted to the 16 CES/CEV. The contractor must have a copy of all required permits and is responsible for reading, understanding and abiding by all conditions and requirements of the environmental permits.

1. Sanitary Sewer Permit: Permit will have to be obtained prior to any work being performed and FDEP has 30 days to review permit. All necessary paperwork (drawings, application, specs, fee, etc.) will be submitted through 16 CES/CEV. After construction, the line will not be put into use until the permit clearance has been applied for and obtained. All necessary paperwork (Certification of Completion Form, as-builts, etc.) will be submitted through 16 CES/CEV and FDEP has 30 days to review. The contractor must provide a copy of the FDEP clearance for each project or partial section thereof to the Base Utility Supervisor **PRIOR** to activation of the pumps and/or valves.
2. Potable Water Permit: Permit will have to be obtained prior to any work being performed and FDEP has 30 days to review permit. All necessary paperwork (drawings, application, specs, fee, etc.) will be submitted through 16 CES/CEV. After construction, the line will not be put into use until the permit clearance has been applied for and obtained. For phased projects a permit clearance can be obtained for each phase by submitting a certification of completion package for each phase as a partial completion on the entire permitted project. All necessary paperwork (Certification of Completion Form, as-builts, bacteriologicals, pressure test results, etc) will be submitted through 16 CES/CEV and FDEP has 30 days to review. The Base Utility Supervisor must have a copy of the FDEP clearance for each project or partial section thereof in-hand before activating the public water to that particular area.
3. Irrigation Permit: An irrigation permit will need to be completed and coordinated with 16 CES/CEV prior to submittal to the Northwest Florida Water Management District (NWFWMD) on NWFWMD Form No. 10. The NWFWMD will not accept the permit unless signed by the designated individual from 16CES/CEV. A well fee is required according to requested pump amount.
4. Wetland Permit: Complete application package including application, 8-1/2" x 11" plan view and cross section drawings of work to be done, site map and application fee (either $250 or $500 check made out to FDEP depending on the impact). Drawings should show any and all best management practices (BMP's) to be incorporated to include locations of silt screens and hay bales. State gets 30 days to request additional information. From time State gets complete application package, they have 90 days to issue or deny permit. Permit must be received and all BMP's in place before any land clearing or construction begins.
5. Stormwater Permits: Permit coverage is required prior to site clearing or pond construction. Two types of Stormwater Permits are available for construction sites. One is the Construction General Permit for NPDES. This permit coverage must be applied for any disturbance totaling more than one acre. The coverage is obtained by submitting a Notice of Intent along with the appropriate permit fee

to FDEP. Prior to applying for this coverage, a Stormwater Pollution Prevention Plan (SWPPP) must be prepared and kept on file at the site. Weekly and storm event inspections are required to ensure BMP's are maintained and functioning. At completion of construction and final stabilization, a Notice of Termination must be filed with FDEP to terminate coverage. This permit is good for periods of up to five years. The other permit type is for Stormwater Treatment Facility construction and requires signed and sealed drawings (FL Registered PE), a permit application, a permit fee, and after construction, a Certificate of Completion. This is done for retention and detention ponds. After filing the application, FDEP has 30 days to review the application, determine if it is complete and if so, issue a letter granting this general permit coverage. All necessary paperwork (drawings, application, specs, fee, etc.) will be submitted through 16 CES/CEV. General Permit conditions must be complied with at all times. Copies of the General Permits and the requirements are available from the FDEP website.

6. Industrial Wastewater Permits: All dewatering projects that discharge to surface waters and/or storm-water systems must be performed in accordance with FAC 62-621 and are required to operate under the coverage of one of two Generic Permits. These are Generic Permit for Discharges from Petroleum Contaminated Sites – FAC 62-621.300(1) or Generic Permit for Discharge of Produced Groundwater from any Non-Contaminated Site Activity - FAC 62-621.300(2). All dewatering activities shall be coordinated through and approved by 16 CES/CEV.
7. Digging Permits: AF Form 103, Base Civil Engineering Work Clearance Request will be completed by the Contractor prior to any earthmoving or subsurface work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01. SUBMITTALS

A. The Contractor shall submit an Environmental Protection Plan within 15 days after receipt of the notice to proceed. Approval of the Contractor's plan will not relieve the Contractor of responsibility for adequate and continuing control of pollutants and other environmental protection measures. The contractor shall obtain approval by the Contracting Officer prior to the start of construction, modification, or demolition for all project facilities and/or equipment. The plan shall include, but shall not be limited to, the following:

1. Legal Requirements: A list of federal, state, and local laws, regulations, and permits concerning environmental protection, pollution control and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations, and permits. Whenever there is a conflict between federal, State, or local laws, regulations, and permit requirements, the more restrictive provisions shall apply.
2. Environmental Protection Procedures: Procedures to be implemented to provide the required environmental protection, to comply with the applicable laws and regulations, and to correct pollution due to accident, natural causes, or failure to follow the procedures of the environmental protection plan.
3. Drawings: Drawings showing locations of any proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials shall be included.
4. Solid Waste Management Plan and Summary of Solid Waste Generated: See paragraph titled Recycling and Solid Waste and subparagraph titled Solid Waste Management Plan Implementation.
5. Emergency Response and Spill Prevention Plan: See paragraph titled Emergency Response and Spill Prevention.
6. Hazardous Material List: See paragraph titled Hazardous Materials.
7. Storm Water Pollution Prevention Plan: See paragraph titled Water Resources
8. Hazardous Waste Management and Disposal Plan: See paragraph titled Hazardous Waste.
9. Green Procurement Purchases: See paragraph titled Green Procurement and also Section 01540 - Green Procurement.

3.02 NATURAL RESOURCES

A. The environmental resources within the project boundaries and those affected outside the limits of permanent work under this contract shall be protected during the entire period of this contract. The Contractor shall confine activities to areas defined by the drawings and specifications. Environmental protections shall be as stated in the following subparagraphs:

1. The contractor shall confine all activities to areas defined by the drawings and specifications. Except in areas indicated on the drawing or specified to be cleared, the Contractor shall not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without permission. Trees, shrubs and other vegetation not identified for removal shall be protected against removal, injury, defacing and scarring-no ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless specifically authorized. Where such emergency use is permitted, the Contractor shall provide effective protection for land and vegetation resources at all times.
2. The Contractor shall not park vehicles or equipment within the drip line of trees. Prior to trimming or removal of trees, contractor shall coordinate with 16 CES/CEV. All merchantable timber that is removed shall be limbed and stacked butt to butt in an out of the way location. Trees that are damaged or removed shall be replaced according to guidance found in the Hurlburt Field Landscape Development Plan.
3. Prior to any construction, the Contractor shall mark the areas not to be disturbed under this contract. Isolated areas within the general work area, which are to be saved and protected, shall also be marked or fenced. The Contractor's personnel shall be knowledgeable of the purpose for marking and/or protecting particular objects.
4. All earthwork shall be planned and conducted to minimize the duration of exposure of unprotected soils. Side and back slopes shall be protected as soon as practicable upon completion of rough grading. Earthwork brought to final grade shall be finished as indicated.
5. The Contractor shall construct or install temporary and permanent erosion and sedimentation control features as indicated on the drawings. Berms, dikes, drains, sedimentation basins, grassing, and mulching shall be maintained until permanent drainage and erosion control facilities are completed and operative.
6. Contractor Facilities and Work Areas: The Contractor's field offices, staging areas, stockpile storage, and temporary buildings shall be placed in areas designated on the drawings or as directed by the Contracting Officer. Temporary movement or relocation of Contractor facilities shall be made only when approved. Borrow areas shall be managed to minimize erosion and to prevent sediment from entering nearby waters. Spoil areas shall be managed and controlled to limit spoil intrusion into areas designated on the drawings and to prevent erosion of soil or sediment from entering nearby waters. Spoil areas shall be developed in accordance with the grading plan indicated on the drawings. Temporary excavation and embankments for plant and/or work areas shall be controlled to protect adjacent areas from despoilment.
7. Previously Used Equipment: The Contractor shall thoroughly clean all construction equipment previously used at other sites before it is brought into the work areas, ensuring that soil residuals are removed and that egg deposits from plant pests are not present; the Contractor shall consult with the USDA jurisdictional office for additional cleaning requirements.

B. Protection of Fish and Wildlife Resources: All species of wildlife are protected on Hurlburt Field, Florida. Feeding, possessing, capturing, and attempting to capture, kill or otherwise harass wildlife is prohibited.
   1. Black Bear and American Alligator: Black bear and American alligator sightings are common on Hurlburt Field. Law protects both animals. Feeding, possession, or harassment of an alligator is a second-degree misdemeanor. The Florida black bear is a state listed threatened species. If a bear is sighted, contact the 16 CES/CEV (884-4651) as soon as possible. Construction sites must be cleared of any food or drink items at the end of each workday. Any items that could attract bears must be carried off the base or placed in a dumpster. Ensure all dumpster doors and lids are securely closed at the end of the day to deter bears from entering and feeding.

3.03 CULTURAL RESOURCES

A. Historical, Archaeological, and Cultural Resources: Existing historical, archaeological, and cultural resources within the Contractor's work area will be so designated by the Contracting Officer if any has been identified. The Contractor shall take precautions to preserve all such resources as they existed at the time they were first pointed out. The Contractor shall provide and install protection measures for these resources and be responsible for their preservation during the life of the contract. Protection measures will be provided by 16 CES/CEV after consultation with the State Historic Preservation Officer on a case-by-case basis.

B. Artifacts Discovered During Construction: If during excavation or other construction activities any previously unidentified or unanticipated resources are discovered or found, all activities that may damage or alter such resources shall be temporarily suspended. Resources covered by this paragraph include

but are not limited to: any human skeletal remains or burials; artifacts; shell, bone, charcoal, or other deposits; rocks or coral alignments, pavings, wall, or other constructed features; and any indication of agricultural or other human activities. Upon such discovery or find, the Contractor shall immediately stop work and notify the Contracting Officer and 16 CES/CEV.

3.04 WATER RESOURCES

A. The Contractor shall keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters. Toxic or hazardous chemicals shall not be applied to soil or vegetation when such application may cause contamination. Monitoring of water areas affected by construction shall be the Contractor's responsibility.

B. Wetlands: Monitoring of wetland and water resources affected by construction activities shall be the responsibility of the Contractor. Wetland affected by construction activities shall be the responsibility of the Contractor. During construction, action will be required to maintain buffer areas and soil erosion measures near water areas that could be adversely affected by construction activities.

C. Stormwater: The contractor shall use proper control and management techniques to ensure storm water criteria are met in accordance with federal, state, and local storm water regulations. Runoff from the construction site or from storms shall be controlled, retarded, and diverted as indicated on the drawings to protected drainage courses by means of diversion ditches, benches, berms, and by any measures required by area wide plans under the Clean Water Act. Prior to any project that disturbs greater than one acre, the contractor must complete a Notice of Intent with FDEP and have a Stormwater Pollution Prevention Plan approved by 16 CES/CEV. A notice of termination must also be filed at the conclusion of the project.

D. Silt screens must be installed prior to start of construction. Silt screens and/or other erosion control devices shall be installed on construction sites that are in or near wetland areas. Silt screens shall consist of trenched and staked filter fabric and trenched and staked hay bales. Filter fabric must be toed 8 inches into the soil to avoid sediments that would be transported via water under the screen. Hay bales must be placed end to end on the down stream side of the screen and be trenched and staked firmly into the ground. Chinking is usually required to fill gaps between the bales. Silt screens must be maintained properly. **Screens and other control devices must be inspected once a week and after any rainfall event totaling 1/2 inch or more to ensure they are in good repair and functioning properly.** Inspection logs should be kept that include result of inspection and corrective measures. In areas that experience high flow rates, extra precautions will be necessary to stabilize screens. Trenching of hay bale barriers is required to adequately control runoff. A series of screens may have to be installed in waters that are especially turbid to properly filter out sediments. Silt screens will remain in place and properly maintained until the site is properly stabilized with sod or seeding. **NOTE: Minimum silt screen construction within 75 feet of any wetland boundary or tributary shall be FDOT Type IV.**

E. In some cases where severe erosion results in waters becoming turbid despite control measures, regular turbidity monitoring and documentation shall be necessary. Any such documentation shall be forwarded to 16 CES/CEV for review.

F. Stream crossings shall allow movement of materials or equipment without violating water pollution control standards of the federal, state or local government.

G. Landscaping: All new landscaping will use Xeroscape techniques and will be watered in accordance with the current stage of the Hurlburt Field Water Conservation Policy. The irrigation system provided shall conform to specification Section 02811, IRRIGATION SYSTEM. All irrigation work shall be coordinated with 16 CES/CEV.

H. Contractor is not authorized sewage holding tanks on base and must procure a portable-potty service contract. The portable-potty contract must include the correct removal of sewage and removal of the portable-potty upon completion of the project.

I. Contractor vehicle and heavy equipment maintenance (including oil changing, lubrication, and vehicle washing) is not authorized on base.

3.05 GREEN PROCUREMENT

A. Per Executive Order 13101, the Environmental Protection Agency (EPA) requires that all government purchases of designated items shall contain at least the minimal amount of post-consumer and/or total recovered materials. EPA-designated items fall into the following categories:
   1. Bio-based Products
   2. Construction Products
   3. Landscape Products
   4. Miscellaneous Products
   5. Non-Paper Office Products
   6. Paper and Paper Products
   7. Park and Recreation Products
   8. Transportation Products
   9. Vehicular Products

B. Specific requirements can be found at the EPA's website: http://www.epa.gov/cpg/products.htm. Also, see section 01540: Green Procurement.

3.06 AIR RESOURCES

A. Equipment operation and activities or processes performed by the Contractor in accomplishing the specified construction shall be in accordance with the State rules and all Federal emission and performance laws and standards. Ambient Air Quality Standards set by the Environmental Protection Agency shall be maintained. The Contractor shall monitor all air areas affected by the construction activities. Monitoring results will be periodically reviewed by 16 CES/CEV to ensure compliance.

B. Ozone Depleting Substances: The contractor shall adhere to Air Force and HFLD policies regarding halons and chlorofluorocarbons (CFCs). The contractor shall not introduce any Class I Ozone Depleting Substances (ODS) to Hurlburt Field during the course of this contract. The contractor shall be responsible for the recovery and recycling of all Class II ODS, including any necessary sampling marking, labeling, and disposal. The contractor may access the Hurlburt Field ODS Management Plan for guidance. However, the contractor shall remain ultimately responsible for any ODS work related to these tasks.

C. Particulates: Dust particles; aerosols and gaseous by-products from construction activities; and processing and preparation of materials, shall be controlled at all times, including weekends, holidays and hours when work is not in progress. The Contractor shall maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and other work areas within or outside the project boundaries free from particulates which would cause the air pollution standards to be exceeded or which would cause a hazard or a nuisance. The Contractor must have sufficient, competent equipment available to accomplish these tasks. Particulate control shall be performed as the work proceeds and whenever a particulate nuisance or hazard occurs.

3.07 RECYCLING AND SOLID WASTE

A. The contractor shall make every attempt to reduce the generation of solid and hazardous waste to the maximum extent possible. The contractor shall utilize the Base Recycling Center (884-7577) for any office paper, cardboard, plastic, aluminum, electrical wire/cable or metal wastes related to a project whenever possible. All wastes, whether recycled or landfilled, shall be weighed prior to disposal. Detailed disposition information shall be reported by the 5th day of each quarter to 16 CES/CEV. Solid wastes (excluding clearing debris) shall be placed in containers and emptied, recycled or landfilled, on a regular schedule. Segregation measures shall be employed so that no hazardous, recyclable, or toxic waste is co-mingled with solid waste. The Contractor shall transport solid waste (items not utilized by Base Recycling Center) off Government property and dispose of it in compliance with federal, state, and local requirements for solid waste disposal. Vehicles used in transporting refuse shall be covered and enclosed to prevent spillage. Expense and cleanup of any spills on or off base are always the responsibility of the contractor.

B. Solid Waste Management Plan: The Solid Waste Management Plan, refer to paragraph titled Submittals, shall include, but not limited to, the following:
   1. Description and estimated quantities of the proposed job-site waste to be generated.
   2. Landfill Options: The name of the landfill(s) where trash will be disposed of, applicable landfill tipping fee(s), and the projected cost of disposing of all project waste in the landfill(s).
   3. Waste Diversion: A list of the waste materials from the project that will be separated for reuse, salvage, or recycling, associated weights and estimated cost savings shall be reported to 16 CES/CEV by the 5th day of each quarter.

4. Handling Procedures: A description of the means by which any waste materials identified in item 3 above will be stored and a description of the means to be employed in recycling the above materials consistent with requirements for acceptance by designated facilities.
5. Transportation: A description of the means of transportation of the waste and recycled materials (whether materials will be site-separated and self-hauled to designated center, or whether mixed materials will be collected by a waste hauler and removed from the site). Request manufacturers to use the minimum packaging required for protection and identification of project products, and to use packaging materials with recycled content where economically feasible in accordance with FAR, Executive Order 13101, and the Hurlburt Field Green Procurement Program Plan.
6. Submit cost information on the Solid Waste Management Plan for Solid Waste Disposal, Recycling, and Cost savings for wastes diverted from the landfill to the Contracting Officer by the 5th day of each quarter.

C. Solid Waste Management Plan Implementation:
1. The Contractor shall designate an on-site party (or parties) responsible for instructing workers and overseeing and documenting results of the Solid Waste Management Plan for the project.
2. The Contractor shall distribute copies of the Solid Waste Management Plan to key personnel and submit the plan to the Contracting Officer as part of the Environmental Protection Plan (see Submittals section).
3. The Contractor shall provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties.
4. The Contractor shall lay out and label a specific area to facilitate separation of materials for potential recycling, salvage, reuse, and return. Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials.
5. The Contractor shall **submit with each Application for Progress Payment, a Summary of Solid Waste Generated** by the project to 16 CES/CEV. Failure to submit this information shall render the Application for Payment incomplete and shall delay Progress Payment. The summary shall be submitted on a form acceptable to the owner and shall contain the following information, including but not limited to, shipping & payment documents, manifests, MSDS's, weight tickets, receipts, invoices, etc.:
   a. The amount (in tons) of material land-filled from the project, the identity of the landfill, the total amount of tipping fees paid at the landfill, and the total disposal cost.
   b. For **each** material recycled, reused or salvaged from the project, the amount (in tons), the date removed from the job-site, the receiving party, the transportation cost, the amount of any money paid or received for the recycled or salvaged material, and the net total cost or savings of salvage or recycling each material.
   c. Any serviceable or salvageable items not accepted by DRMO or Base Supply will become the property of the Contractor and will be properly handled, transported, and disposed of off-base by the Contractor in conformance with the Solid Waste Management Plan and with all applicable federal, state, and local regulations.

3.08 HAZARDOUS WASTE *(Includes Special and Universal Waste)*

A. The Contractor shall be considered the primary co-generator for all hazardous wastes generated throughout the duration of the contract. However, all hazardous waste management activities shall be coordinated through and approved by 16 CES/CEV.

B. Prior to starting work, the contractors and key personnel must attend the Hurlburt Field Hazardous Waste Awareness and Accumulation Point Managers Training. This includes contractors, subcontractors, field supervisors and field workers. This classroom instruction contains useful information concerning the proper identification and storage and disposal of hazardous wastes commonly generated at the job site. The class is held monthly on Hurlburt Field, is free of charge for all who wish to attend and lasts approximately 3-1/2 hours. For training reservations, call or e-mail Randy Trent at 850-884-7923 or randy.trent@hurlburt.af.mil.

C Hazardous and Special Waste includes, but are not limited to:
1. Fuels and oils of all types
2. Used tires
3. Computer monitors
4. Lighting ballast
5. Exit signs and lighting (batteries)
6. Asbestos (survey required)
7. Lead roof vent flashing
8. All electronic devices
9. Aerosol spray cans (including empties)
10. Paints

11. Adhesives
12. Corrosives
13. Non-flammable and non-corrosive cleaners
14. Fertilizer
15. Hydraulic fluid
16. Antifreeze
17. Paint chips and dust from sanding or sandblasting
18. Smoke detectors/alarms
19. Rags/wipes contaminated with hazardous waste or oil

D. Universal Waste includes, but are not limited to:
1. Spent fluorescent lamps
2. High Intensity Discharge (HID) lamps
3. Batteries (except alkaline)
4. Mercury thermostats
5. Silent switches containing mercury
6. Mechanical switches containing mercury
7. Relays and contacts containing mercury

E. All hazardous, special, and universal waste items mentioned-above must be managed IAW local, state, federal and Hurlburt Field rules and instructions. The Contracting Officer shall contact 16 CES/CEV (884-4651) if handling procedures for hazardous waste and materials is unclear. **Under no circumstances may hazardous, special, or universal waste be disposed of in the dumpster.**

F. The contractor is responsible for disposing of all wastes generated on base. This task is to be accomplished in compliance with all local, state, federal and Hurlburt Field rules and instructions, including mandated recycling requirements. The contractor shall identify what wastes are hazardous using specific and technical knowledge and/or sampling and analysis. This responsibility also includes preparation of waste profile sheets, packaging, marking and labeling of wastes in accordance with 49 CFR Subchapter C.

G. All cost for labor, equipment, materials, transportation, and other services required to comply with federal, state, and local laws and regulations governing hazardous/special waste generations are the responsibility of the contractor. This requirement extends to personnel training and the identification of initial accumulation and transportation of hazardous waste generated during the project.

H. The contractor shall be familiar with and have immediate access to the following publications and regulations:
1. Environmental Protection Agency (EPA): Title 40 CFR, Parts 260-279, Hazardous Waste and Used Oil Management
2. Occupational Safety and Health Administration (OSHA): Title 29 CFR, Parts 1910 and 1926
3. Department of Transportation (DOT): Title 49 CFR, Parts 171-177
4. Hurlburt Field (HFLD) Hazardous Waste Management Plan

I. The contractor shall manage all Hazardous Waste, Special Waste, and Universal Waste IAW the HFLD Hazardous Waste Management Plan. In addition, the contractor shall ensure that all employees, including their subcontractors, comply with the rules and procedures outlined in this specification and the HFLD Hazardous Waste Management Plan.

J. If transportation of hazardous waste is required, the contractor shall possess or ensure the transportation company used for transportation of hazardous waste has a valid state and federal identification number and provide such identification to 16 CES/CEV prior to any waste movement. The contractor shall ensure a designated representative from 16 CES/CEV Environmental Flight signs the hazardous waste/non-hazardous waste manifest.

3.09 HAZARDOUS MATERIALS

A. For the purposes of the document, Hazardous Materials (HM) are defined as any product, material, chemical or substance listed in 49 CFR 172.101 (revised) and 40 CFR 302-304 (revised). Specifically, a HM is any substance or material, in any quantity or form that has the potential to harm human health or the environment or displays specific characteristics (reactive, corrosive, ignitable, and toxic).

B. **Absolutely NO HM shall be brought onto Hurlburt Field until that material is registered with the Hazardous Materials Pharmacy (HAZMART) per AFI 32-7086 (Hazardous Material Management)** This requirement shall apply for all HM that the contractor intends to bring onto government property for any/all processes or applications. The contractor shall submit a complete hazardous material inventory list including Material Safety Data Sheets and any other supporting documentation for each HM used prior to start of the contract or introduction of that material to Hurlburt Field. The HM inventory shall

include the contract number, performance period, and a contractor point of contact for HM matters. All excess material and empty containers are the responsibility of the contractor and shall be removed accordingly at the end of the contract. Should contractor HM requirements change during the performance period, the Contractor shall immediately notify the HAZMART of such changes in writing.

C. Storage of Hazardous Materials: All HM shall be stored at Hurlburt Field with approval and coordination from 16 CES/CEV, the base Fire Department (16 CES/CEF), and Wing Safety. The contractor shall observe HM storage practices in accordance with regulations, policies, plans and procedures employed by the base.

D. All contractor personnel shall immediately report to the Contracting Officer and 16 CES/CEV any hazardous materials, substances (including suspect asbestos containing materials), chemicals, or contaminated areas encountered. Further, the contractor personnel shall immediately cease work in the area unless the work is of an emergency nature and the risk of exposure can be mitigated by the use of personal protective equipment (PPE) or clothing. The government will determine the best means of sampling and corrective action and will notify the contractor accordingly.

E. The contractor shall not use, store, or handle any Class I ODS during the course of this contract.

F. All hazardous materials and waste resulting from construction projects (including renovation/repair and demolition) shall be managed in accordance with local, state, federal and Hurlburt Field rules and regulations.

3.10 TOXIC WASTE

A. Asbestos: All asbestos work must be accomplished in accordance with federal, state, and local laws and the Hurlburt Field Asbestos Management Plan. See Section 02075.

1. Notice of Asbestos Renovation or Demolition, DEP Form 62-257.900(1) must be submitted to Florida Department of Environmental Protection at least 10 working days prior to any demolition and/or renovation regardless of whether asbestos is present or not. A copy of this notification must be provided to 16 CES/CEV prior to performing any work.
2. A copy of all submittals must be provided to 16 CES/CEV with adequate time built in for review.
3. **The use of materials, products or equipment containing asbestos will not be allowed in the construction of this project. See sample list below.**
4. Prior to the commencement of construction, the prime contractor, each subcontractor and material/equipment supplier shall provide the Contracting Officer and 16 CES/CEV with a Notarized statement that to the best of their knowledge, no asbestos will be used in the construction of this project. Additionally, the contractor must have available the most current **Material Safety Data Sheet** (MSDS) proving the materials contain no asbestos.
5. Sample List of Asbestos Containing Materials (ACM): **Caution needs to be taken to ensure that materials purchased do not contain more than one percent asbestos by volume.**
   Note: The following list does not include every product/material that may contain asbestos. It is intended as a general guide to show which types of materials may contain asbestos:

1. Cement Pipes	2. Cement Wallboard	3. Cement Siding
4. Asphalt Floor Tile	5. Vinyl Floor Tile	6. Vinyl Sheet Flooring
7. Flooring Backing	8. Construction Mastics	9. Acoustical Plaster
10. Decorative Plaster	11. Textured Paints/Coatings	12. Ceiling Tiles & Lay-in-Panels
13. Spray-Applied Insulation	14. Blown-in Insulation	15. Fireproofing Materials
16. Taping Compounds (thermal)	17. Packing Materials (for wall/floor penetrations)	18. High Temperature Gaskets
19. Laboratory Hoods	20. Laboratory Gloves	21. Fire Blankets & Table Tops
22. Fire Curtains	23. Elevator Equipment Panels	24. Elevator Brake Shoes
25. HVAC Duct Insulation	26. Boiler Insulation	27. Breeching Insulation
28. Ductwork Flexible Fabric Connections	29. Cooling Towers	30. Pipe Insulation (corrugated air cell, block, etc.)
31. Heating and Electrical	32. Electrical Panel Partitions	33. Electrical Cloth ducts
34. Spackling compounds	35. Chalkboards	36. Roofing Shingles
37. Roofing Felt	38. Base Flashing	39. Thermal Paper Products
40. Fire doors	41. Caulking/putties	42. Adhesives
43. Wallboard	44. Joint Compounds	45. Vinyl Wall Coverings
46. Electrical Wiring Insulation		

B. Lighting Ballast: When fluorescent and mercury vapor fixtures are removed, the ballast must be examined for Polychlorinated Biphenyls (PCB) labeling. Ballasts are presumed to contain PCBs unless they are clearly labeled **"NO PCBs"**. Suspected ballasts must be removed and disposed of IAW Hurlburt Field Directives.

C. Lead Based Paint: No paint containing lead shall be used during the course of this contract. The Occupational Health and Safety Administration (OSHA) Lead Construction Standard, 29 CFR 1926.62 is in effect whenever materials are disturbed that contain any amount of lead. This will require contractors disturbing lead-based paint to institute medical surveillance, training, engineering controls, worker protection measures and employee monitoring until monitoring results per the lead paint standard demonstrate that employee exposure is below the action level and permissible exposure limit. The contractor on site must maintain all documentation regarding lead exposure by either historical data or project data. **This data shall also be made available to 16 CES/CEV upon completion of the project.**

1. Prior to the commencement of construction, the prime contractor, each subcontractor and material/equipment supplier shall provide the Contracting Officer and 16 CES/CEV with a Notarized statement that to the best of their knowledge, no lead based paint will be used in the construction of this project. Additionally, the contractor must have available the most current Material Safety Data Sheet proving that the paint does not have lead content.
2. The contractor shall be responsible for collection and disposal of all lead paint chips and lead paint-contaminated materials, and for accumulation of these chips/materials on site. The contractor shall test the paint materials, provide containers for proper disposal, and transport any resulting hazardous waste to an appropriate hazardous waste accumulation area should it test positive as hazardous waste. All necessary accumulation, disposal activities and documentation shall be coordinated with the 16 CES/CEV Environmental Flight.
3. A copy of contractor's exposure assessment data shall be provided to 16 CES/CEV.
4. The Contractor shall provide copies of all lead paint-related documentation generated from this project, including lead testing, air monitoring and hazardous waste manifests, to the Contracting Officer. A copy shall be forwarded to 16 CES/CEV within 10 working days of task completion.
5. **On Military Family Housing Projects,** there shall be in-depth coordination with 16 CES/CEH to allow for resident notification and necessary arrangements.

The contractor is strongly encouraged to coordinate closely with 16 CES/CEV for any required guidance on these critical issues.

3.11 EMERGENCY RESPONSE, SPILL PROCEDURES, FUEL TANKS

A. **All fuel, oil, and chemical spills that occur on Hurlburt Field (regardless of amount) must be immediately reported to the base fire department (911).** The contractor is required to familiarize his/her personnel with spill procedures, fire suppression systems and Material Safety Data Sheets for all materials used and/or stored on the project site. Immediately after notifying the base Fire Department of a release, the contractor shall notify the Contracting Officer and 16 CES/CEV. A verbal report must be made to 16 CES/CEV within one (1) hour of discovery followed by a detailed written notification within 24 hours. Cost incurred from a contractor is the responsibility of the contractor, and the contractor shall reimburse any government cost within 30 working days from the date the spill occurred.

B. The contractor shall provide and maintain spill clean-up equipment, sufficient in both type and quantity, at all sites involving the storage, and handling of hazardous materials and/or hazardous wastes. The type of equipment and quantity required will be identified in the contractor's site specific contingency plans. Equipment must be adequate to contain any release. Contractor shall train employees in the use of the above-mentioned equipment and document training. The contractor shall take sufficient measures to prevent spillage of hazardous and toxic materials during dispensing and shall collect waste in suitable containers observing chemical compatibility requirements. If the contractor is required to stockpile contaminated soil for testing prior to disposal, the Contracting Officer will inform the contractor of the stockpile location after consultation with 16 CES/CEV. Cleanup and cleanup costs, due to spills, shall be the contractor's responsibility.

C. The Emergency Response Plan as required in submittals section shall include, but not be limited to the following:

1. Information for review by the Contracting Officer to show that the contractor has successfully performed hazardous waste management in the past (as applicable). The information shall include the name, location, phone number, and person to contact at two facilities where the contractor has performed such work.

2. The generic "Site Specific Spill Prevention/Response Plan" submitted with the technical proposal shall be adapted to specific sites where the contractor handles chemicals or hazardous materials. Site-specific spill plans shall be revised as necessary to reflect current hazardous material storage and usage. The plan shall detail the contractor representative and alternate that will be contacted in the event of an emergency. The plan will identify equipment that will be used to contain and clean up spills. Revisions to the plan shall be coordinated with 16 CES/CEV through the Contracting Officer.

D. 16 CES/CEV must approve the use of fuel storage tanks on base, and the contractor must ensure that adequate spill containment material (spill kits) are available for any tanks approved for use on Hurlburt Field. The contractor must have written spill procedures for tanks and heavy equipment that they use on base. Temporary storage of gasoline or diesel products are NOT PERMITTED on base without approval from 16 CES/CEV.

E. Contractor vehicle and heavy equipment maintenance (including oil changing, lubrication, and vehicle washing) is not authorized on base.

F. POL/Storage Tanks: Storage Tanks and POL can be a source of contamination if not managed appropriately. Contractor personnel obtaining fuels from Storage Tanks agrees to follow all FAC 62-762 and the following list of Air Force Technical Order's to ensure compliance: 37-1-1, 37A-1-101, 42B-1-1, 42B-1-1S-2, 42B-1-16, 42B-1-23, and Compressed Gas Association Pamphlet P-1-1965.

3.12 LABORATORY REQUIREMENTS

A. As required, the contractor shall use a laboratory capable of performing all analysis required to determine Resource Conservation and Recovery Act (RCRA) characteristics such as, but not limited to, Toxicity Characteristic Leaching Procedure (TCLP) metals, TCLP volatile and semi-volatile organic, flashpoint, reactivity, and pH. The laboratory shall also be capable of performing any analysis required to determine the applicability of the used oil criteria detailed in 40 CFR, Part 279. The contractor shall ensure that all analytical work is performed IAW the methods and procedures, including QA/QC requirements, detailed in EPA SW-8467. The analytical laboratory shall be capable of providing accurate, complete data within eight (8) working days. Field analysis and portable instrumentation shall not be used to fulfill laboratory requirements. The contractor shall retain all data on file for a minimum of three years and keep it readily available for inspection by any authorized agency, including 16 CES/CEV Environmental Flight. Chain-of-custody documents shall be included with these records. At the end of the contract, all of these data files may be transferred to 16 CES/CEV.

3.13 POST CONSTRUCTION CLEANUP

A. The Contractor shall clean up all areas affected by construction and restore them back to their original condition to include landscaping, silt fences, planting of trees, grass, and shrubs damaged by construction; and raking and disposal of debris such as roof shingles, paper, nails, glass, sheet metal, bricks, and waste concrete. Backfilled areas shall be compacted properly and replanted with grass.

3.14 INSTALLATION RESTORATION MANAGEMENT

A. The Contractor acknowledges the Hurlburt Field Installation Restoration Program (IRP) and the IRP Management Action Plan. The Contractor shall comply with all aspects of the plan and will utilize the AF Form 103 (Base Civil Engineering Work Clearance Request) Digging Permit process before performing any earthmoving or subsurface work.

B. Contractors awarded construction projects on Hurlburt Field should be aware of the potential to encounter soil and/or groundwater contamination throughout many areas of the base. The following guidance has been developed to assist in the construction of projects in possibly contaminated areas (IRP sites).

1. Guideline Set 1 is the most stringent and involves projects in an area that has known contamination and regulatory land use controls.
2. Guideline Set 2 applies to projects near a known IRP site with suspected contamination.
3. Guideline Set 3 is general and applies to any areas of the base where contamination has not been confirmed. It is imperative that contractors involve 16 CES/CEV early and often in the construction process to minimize the impact that contaminated soils and/or groundwater may have on their project.

C. GUIDELINE SET 1. Projects located on a site with known soil and/or groundwater contamination with land use controls:

1. There are land use controls on this area imposed by an environmental regulatory agency to protect public health.
2. Contractor should investigate and plan to ensure all monitor wells and cleanup systems are avoided.
3. Contractor shall educate workers on potential to encounter contamination and to assure workers are adequately protected with personal protective equipment.
4. If unusual soil or groundwater color or odor is encountered during subsurface construction work, contact 16 CES/CEV.

D. GUIDELINE SET 2. Projects located near a site with known or suspected soil and/or groundwater contamination without land use controls:
   1. If unusual soil or groundwater color or odor is encountered during subsurface construction work, contact 16 CES/CEV.
   2. Contractor should investigate and plan to ensure all monitor wells and cleanup systems are avoided.
   3. Contractor shall educate workers on potential to encounter contamination and to assure workers are adequately protected with personal protective equipment.

E. GUIDELINE SET 3. Sites without land use control and not in close proximity to known contamination or an IRP site:
   1. If unusual soil or groundwater color or odor is encountered during subsurface construction work, contact 16 CES/CEV.
   2. Contractor shall educate workers on potential to encounter contamination and to assure workers are adequately protected with personal protective equipment.

F. Be aware that the regulatory agency can halt the project for long periods of time due to the discovery of contamination. Cooperation between the contractor and 16 CES/CEV will result in expediting the progress of construction with IRP compliance issues.

END OF SECTION

SECTION 01580 PROJECT IDENTIFICATION SIGN

PART 1 GENERAL

1.01 RELATED SPECIFICATION SECTIONS:
A. Section 01000 – GENERAL REQUIREMENTS

1.02 SECTION INCLUDES:
A. Project Identification Sign.

1.03 QUALITY ASSURANCE:
A. Design sign and structure in accordance with drawing shown on page 2 of this specification.

B. Use experienced professional sign painter.

C. Finishes shall be adequate to withstand weathering, fading, and chipping, for duration of construction.

PART 2 PRODUCTS

2.01 SIGN MATERIALS:
A. Structure and Framing: New, pressure-treated 4 x 4 x 12' support posts.

B. Sign Surfaces: Exterior grade plywood, A-C, 1/2" thick, 4'-0" x 8'-0".

C. Paint and Primers: Exterior professional quality, high-gloss alkyd enamel.

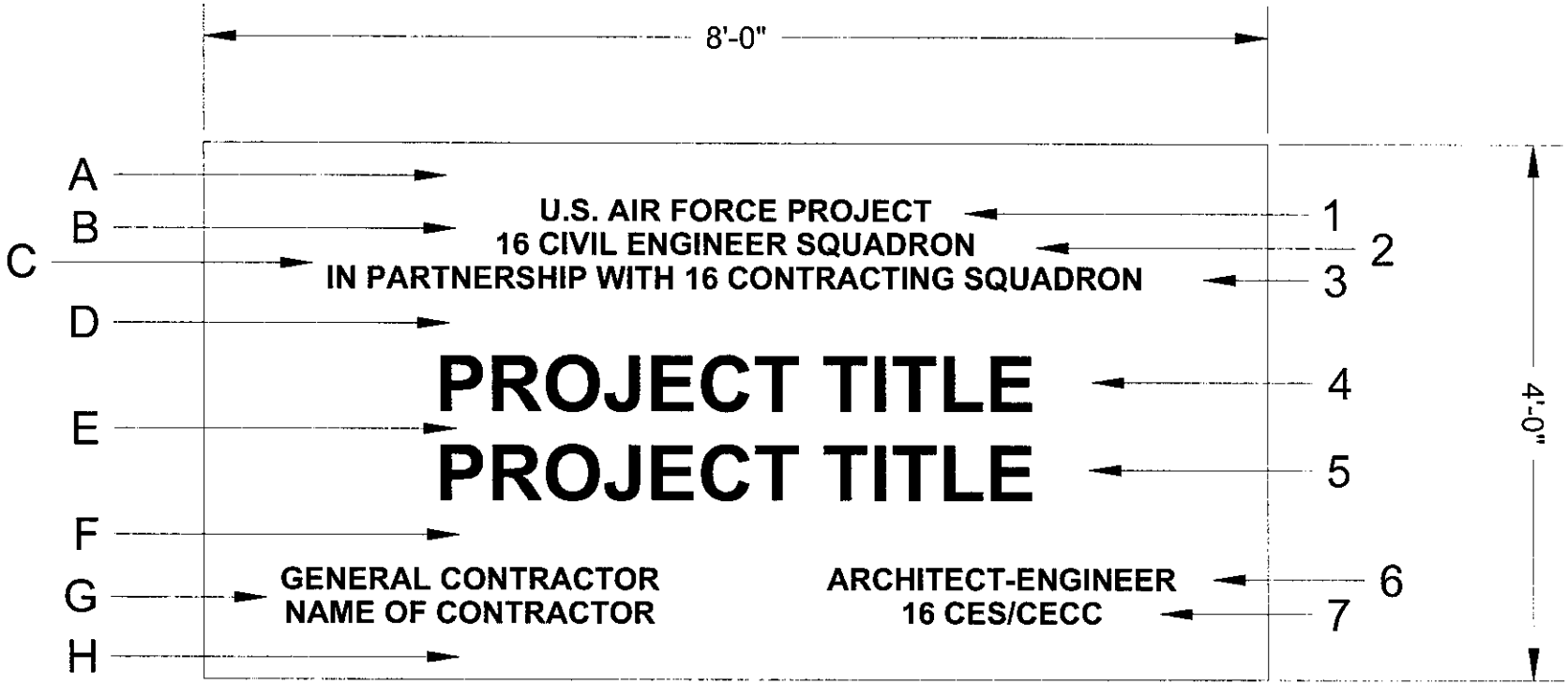
D. Lettering: Exterior quality paint as per above, or pre-cut vinyl self-adhesive products, in accordance with attached drawing.

PART 3 EXECUTION

3.01 INSTALLATION:
A. Install project identification sign within 15 days after Notice to Proceed.
   1. Install at a location of high public visibility adjacent to main entrance to site.
   2. Erect sign surface plumb and level. Anchor securely.
   3. Paint exposed surfaces of sign, supports, and framing.

3.02 MAINTENANCE:
A. Maintain sign and supports clean.
B. Repair deterioration and damage.

3.03 REMOVAL:
A. Remove signs, framing, supports, and foundations at completion of project and restore the area.



SPACE	HEIGHT
A	5"
B	1"
C	1"
D	6"
E	3"
F	6"
G	1"
H	5"

LINE	LETTER HEIGHT	STROKE
1	2"	3/16"
2	2"	3/16"
3	2"	3/16"
4	5"	1/2"
5	5"	1/2"
6	2"	3/16"
7	2"	3/16"

1. USE 1/2" GRADE A-C EXTERIOR PLYWOOD
2. PAINT WITH EXTERIOR GLOSS ENAMEL:
   a. 1 COAT PRIMER
   b. 2 COATS COLOR #20122, FED. STANDARD 595B
   c. WHITE LETTERS
3. MOUNT SECURELY ON PRESSURE TREATED 4x4s, WITH BOTTOM 4' FROM GRADE
4. REMOVE SIGN AFTER COMPLETION OF CONSTRUCTION

SECTION 01600 MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.01 RELATED SPECIFICATION SECTIONS:
A. Section 01000 – GENERAL REQUIREMENTS

1.02 PRODUCTS
A. Products; means new material, machinery, components, equipment, fixtures and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the work. Products may also include existing materials or components required for reuse.

B. Do not use materials and equipment removed from existing premises except as specifically permitted by the Contract Documents and approved by the Contracting Officer.

C. Provide interchangeable components of the same manufacturer for similar components.

1.03 TRANSPORTATION AND HANDLING:
A. Transport and handle products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement or damage.

1.04 STORAGE AND PROTECTION:
A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weathertight, climate controlled enclosures.

B. For exterior storage of fabricated products, place on sloped supports above ground.

C. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.

D. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

E. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement or damage.

F. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

1.05 PRODUCT OPTIONS:
A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers with a Provision for substitutions: Submit a request for substitution for any manufacturer not named.

1.06 SUBSTITUTIONS:
A. Substitutions will be considered under provisions of Section 01000.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

C. A request constitutes a representation that the contractor:
1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.

2. Will provide the same warranty for the substitution as for the specified product.
3. Will coordinate installation and make changes to other work which may be required for the work to be complete with no additional cost to the Government.
4. Waives claims for additional costs or time extension which may subsequently become apparent.
5. Will reimburse Government for redesign services associated with the request.

D. **Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals without separate written request, or when acceptance will require revision to the Contract Documents.**

E. Substitution Submittal Procedure:
1. Submit four (4) copies of request for substitution for consideration. Limit each request to one proposed substitution.
2. Submit shop Drawings, product data, and certified test results attesting to the proposed product equivalence.
3. Submit one (1) copy of the material specification, product data, and a physical sample of each finish material (carpet, rubber/vinyl base, wall covering, vinyl composition tile, ceramic tile, acoustical ceiling, etc.) of the specified material for which a substitution is proposed. This information will be used to compare the proposed substitution to the specified material to assure compliance with the contract requirements.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01650 STARTING OF SYSTEMS

PART I GENERAL

1.01 RELATED SPECIFICATION SECTIONS:

A. Section 01000 – GENERAL REQUIREMENTS

1.02 STARTING SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify project inspector 7 days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or other conditions, which may cause damage.

D. Verify that tests, meter readings and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of responsible manufacturer's representative if required by manufacturer or contractors' personnel in accordance with manufacturers' instructions.

G. When specified in individual Specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Submit a written report in accordance with applicable Section of Specifications that equipment or system has been properly installed in accordance with manufacturer's installation instructions and is functioning correctly.

1.03 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of products to Government personnel 7 days prior to date of final inspection.

B. Utilize operation and maintenance manuals as basis for demonstration. Review contents of manual with government personnel in detail to explain all aspects of operation and maintenance.

C. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled times, at equipment designated location.

D. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

1.04 TESTING, ADJUSTING AND BALANCING

A. Contractor will appoint, employ and pay for services of an independent firm to perform testing, adjusting and balancing.

B. Reports will be submitted by the independent firm to the Contracting Officer indicating observations and results of tests and indicating compliance or non-compliance with specified requirements and with the requirements of the Contract Documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01700 CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 RELATED SPECIFICATION SECTIONS:
A. Section 01000 – GENERAL REQUIREMENTS

1.02 SECTION INCLUDES
A. Closeout procedures.

B. Final cleaning.

C. Adjusting.

D. Project record documents.

E. Operation and maintenance data.

F. Spare parts and maintenance products.

G. Warranties.

H. Maintenance service.

1.03 CLOSEOUT PROCEDURES
A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for final inspection.

B. Upon completion of final inspection, correct punch list items to the satisfaction of the government, and submit all closeout documents, the Government shall take beneficial occupancy of building (BOD). **All warranties will start when government takes BOD.**

C. Provide closeout submittals to Government as required by contract documents. Complete and submit attached closeout checklist.

1.04 FINAL CLEANING
A. Execute final cleaning prior to final inspection.

B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum and remove any stains from carpeted and soft surfaces.

C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

D. Replace filters of operating equipment.

E. Clean debris from roofs, gutters, downspouts, and drainage systems.

F. Clean site; sweep paved areas, rake clean landscaped surfaces.

G. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.05 ADJUSTING
A. Adjust operating products and equipment to ensure smooth and unhindered operation.

1.06 PROJECT RECORD DOCUMENTS
A. Maintain on site one set of the following record documents; record actual revisions to the Work:

1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed Shop Drawings, Product Data, and Samples.
6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction. Do not put extraneous marks or other information on these documents. Maintain documents in good, clean condition free from tears or damage.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each construction change on the respective drawing sheet or sheets to record actual construction including:
   1. Addenda issued prior to receipt of bid or proposal.
   2. Change orders issued during the construction phase.
   3. Measured depths of foundations in relation to finish floor datum.
   4. Measured horizontal and vertical locations of underground utilities and appurtenances referenced to permanent surface improvements.
   5. Measured locations of external and internal utilities, and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   6. Field changes of dimension and detail.
   7. Details not on original Contract drawings.
   8. Field changes related to materials.

G. Prior to final inspection the contractor shall:
   1. Submit original record documents to Contracting Officer. Contractor is advised to have a reproduced copy of the original record documents made for their records.
   2. Obtain Disc copies of the contract drawings in AUTOCAD 14 format. Correct drawing files (sheets) to reflect all as-built conditions based on the changes made as per item F. above. Add the words "AS BUILT" to the revision block of each sheet title block, the date the drawings were changed and the initials of the person making the change.
   3. Submit one set of prints of the corrected contract drawing files to allow Base Civil engineer to verify accuracy of the corrected drawings against the record documents.
   4. Upon review and approval of the corrected contract drawing files, provide disc copies to the government for their records.
   5. Completed Construction Data Worksheet. See Section 01000, paragraph 1.07
   6. Project Closeout Check List. See end of section.
   7. **See Section 01000, paragraph 1.15.C referencing 3% payment retention until receipt and approval of Closeout Documents.**
   8. **See Section 01010, paragraph 3.05. referencing location of buildings, etc. to be submitted with As-Built documents.**

H. Upon acceptance of the building, project record documents and the "As Built" drawings by the Contracting Officer and the Base Civil Engineer, final payment will be made to the contractor

1.07 OPERATION AND MAINTENANCE DATA

A. Submit data bound in 8-1/2 x 11 inch text pages, three ring binders with durable plastic covers. General contractor shall assemble all O & M data required on project and submit as a single submittal

B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.

C. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

D. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, typed on white paper, in three parts as follows:
   1. Part 1: Directory, listing names, addresses, and telephone numbers of Contractor, Subcontractors, and major equipment suppliers.
   2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
      a. Significant design criteria.
      b. List of equipment.
      c. Parts list for each component.
      d. Operating instructions.
      e. Maintenance instructions for equipment and systems.
      f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
   3. Part 3: Project documents and certificates, including the following:
      a. Shop drawings and product data.
      b. Air and water balance reports.
      c. Certificates.
      d. Photocopies of manufacturer's warranties.

E. Submit 1 draft copy of completed volumes 5 days prior to final inspection. This copy will be reviewed and returned after final inspection, with comments. Revise content of all document sets as required prior to final submission.

F. Submit two sets of revised final volumes, within 10 days after final inspection.

1.08 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Provide spare parts, maintenance, and extra products in quantities specified in individual specification sections.

B. Deliver to Project site and place in location as directed; obtain receipt prior to final payment.

1.09 CONTRACTOR/SUBCONTRACTOR WARRANTIES

A. Provide triplicate notarized copies.

B. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers.

C. Submit prior to final Application for Payment.

D. All warranties shall be submitted within 10 days from BOD with warranty start dates printed on warranties.

1.10 MAINTENANCE SERVICE

A. Furnish service and maintenance of components where indicated in specification sections during the warranty period.

B. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

C. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

D. Maintenance service shall not be assigned or transferred to any agent or Subcontractor without prior written consent of the Government

PART 2 PRODUCTS (NOT USED); PART 3 EXECUTION (NOT USED)

END OF SECTION

PROJECT CLOSEOUT CHECK LIST

PROJECT # AND TITLE: _____
CONTRACTOR: _____

CONTRACTOR (mark n/a next to those items that are not applicable for this project)

_____ TEST AND BALANCE REPORT SUBMITTED, APPROVED AND INCLUDED IN THE O&M MANUALS. REPORT SHALL BE SUBMITTED PRIOR TO FINAL INSPECTION.

_____ HAVE O&M MANUALS BEEN SUBMITTED AND APPROVED. MANUALS ARE TO BE ASSEMBLED BY THE GENERAL CONTRACTOR AND SUBMITTED UNDER A SINGLE COVER PER SECTION 01700. (SEE ATTACHED LIST). MANUALS SHALL BE SUBMITTED PRIOR TO FINAL INSPECTION.

_____ PUNCH LIST COMPLETED.

_____ HAS MECHANICAL AND ELECTRICAL IDENTIFICATION BEEN COMPLETED.

_____ HAS COMPLETED CONSTRUCTION DATA WORKSHEET.

_____ HAVE THE RECORD DOCUMENTS AND AS-BUILT DRAWINGS BEEN SUBMITTED AND APPROVED PER SECTION 01700.

_____ HAS THE DDC PROGRAMMING FOR THE HOST COMPUTER BEEN DOWN LOADED TO THE CONTROLS SHOP.

_____ HAS FINAL CLEANING BEEN COMPLETED.

_____ HAVE SPARE PARTS BEEN TURNED OVER TO THE GOVERNMENT. (SEE ATTACHED LIST)

_____ HAVE WARRANTIES BEEN SUBMITTED AND APPROVED. (SEE ATTACHED LIST)

_____ HAVE DIGITAL RECORD DRAWINGS BEEN SUBMITTED (SECTION 02811 LANDSCAPE IRRIGATION AND 15330 FIRE SUPPRESSION)

_____ HAS ALL REQUIRED TRAINING BEEN ACCOMPLISHED. (SEE ATTACHED LIST)

_____ HAS ALL REQUIRED TESTING BEEN ACCOMPLISHED. (SEE ATTACHED LIST).

_____ HAVE ITEMS TO BE TURNED OVER TO GOVERNMENT BEEN TURNED OVER.

_____ HAVE REPLACEMENT TREES BEEN PLANTED IN AUTHORIZED LOCATION

_____ IS CONSTRUCTION SITE STABLE, NO EROSION

_____ HAS ALL CONTRACTOR HAZMAT BEEN REMOVED FROM PROJECT SITE

_____ HAS CONTRACTOR SUBMITTED THE TOTAL HAZARDOUS MATERIALS USED DURING CONTRACT

_____ HAS CONTRACTOR PROVIDED WITNESSED AND NOTARIZED STATEMENT THAT PROJECT WAS CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS INCLUDING ALL CHANGES MADE DURING THE CONSTRUCTION PHASE.

_____ WARRANTY FORM

PROJECT # AND TITLE: _____
CONTRACTOR: _____

INSPECTORS

_____ HAVE THE ABOVE ITEMS BEEN COMPLETED BY THE CONTRACTOR.

_____ HAS 100% COMPLETION LETTER AND BLUE BOOKS BEEN SENT TO CONTRACTING.

_____ HAS FINAL PAYMENT BEEN APPROVED.

_____ HAS WARRANTY DATE BEEN ESTABLISHED. DATE:_____

_____ HAVE RECORD DRAWINGS AND ORGINALS BEEN TURNED OVER TO DRAFTING FOR DOING AS-BUILTS AND FILING.

_____ HAVE O&M MANUALS BEEN TURNED OVER THE SHOPS.

_____ HAS 1354 BEEN COMPLETED AND TURNED OVER TO REAL PROPERTY ALONG WITH INPECTORS AND ENGINEERS FOLDERS. **

_____ HAS CONTRACTOR'S WRITTEN, WITNESSED AND NOTARIZED STATEMENT RE COMPLETION OF THE PROJECT BEEN TURNED OVER TO THE GOVERNMENT. SEE ECTION 01000 GENERAL REQUIREMENTS, PARAGRAPH 1.15.

_____ HAS PERFORMANCE EVALUATIONS BEEN RECEIVED, COMPLETED AND RETURNED.

_____ HAVE ASBESTOS RECORDS BEEN RECEIVED FROM CONTRACTOR AND TURNED OVER TO CEV.

_____ HAVE ENVIRONMENTAL PERMIT CERTIFICATIONS ISSUED FOR POTABLE WATER, SANITARY SEWER, OR STORMWATER BEEN CLOSED OUT.

** 1354 SHOULD BE COMPLETED PRIOR TO TURNING IN O&M MANUALS, AS-BUILTS DRAWINGS AND BLUE BOOKS.

PROJECT # AND TITLE: _____
CONTRACTOR: _____

SPARE PARTS

_____ Section 09511 ceiling tile
_____ Section 12512 blinds
_____ Section 15623 filters
_____ Section 16470 keys
_____ Section 16530 lamps
_____ Section 09650 flooring base
_____ Section 15330 fire sup. heads
_____ Section 15855 filters
_____ Section 16495 keys
_____ Section 16730 intrusion detection

O&M MANUALS

_____ Section 02811 irrigation sys
_____ Section 09688 carpet
_____ Section 11306 lift stations
_____ Section 15330 fire suppr.
_____ Section 15430 plumbing spec.
_____ Section 15450 pluming eq.
_____ Section 15540 pumps
_____ Section 15623 furn. & a/c
_____ Section 15682 chillers
_____ Section 15870 ventilators
_____ Section 15975 controls
_____ Section 16495 transfer switch
_____ Section 16510 interior lights
_____ Section 16615 emer. power
_____ Section 16721 fire alarm
_____ Section 09311 ceramic tile
_____ Section 10522 fire extinguishers
_____ Section 15410 plumbing piping
_____ Section 15440 plumbing fixtures
_____ Section 15515 hydronic spec.
_____ Section 15558 boilers
_____ Section 15625 unit heaters
_____ Section 15855 air handlers
_____ Section 15930 terminal units
_____ Section 16321 transformers
_____ Section 16496 bypass switch
_____ Section 16530 site lighting
_____ Section 16622 generators
_____ Section 16730 intrusion detection

WARRANTIES

_____ Section 02281 termite control
_____ Section 07900 joint sealers
_____ Section 08210 wood doors
_____ Section 13121 metal bldgs
_____ Section 15450 water heater
_____ Section 15623 compressor
_____ Section 15682 chiller
_____ Section 16531 ballfield lighting
_____ Section 16622 generator
_____ Section 07410 metal roofing
_____ Section 07550 bituminous roofing
_____ Section 13121 metal bldg. roofing
_____ Section 15440 water cooler
_____ Section 15558 boiler
_____ Section 15625 unit heater
_____ Section 15930 terminal units
_____ Section 16615 emer. Power supply

TRAINING

_____ Section 15558 boilers
_____ Section 15975 controls
_____ Section 16721 alarm system
_____ Section 15682 chillers
_____ Section 16622 generators

PROJECT # AND TITLE: _____
CONTRACTOR: _____

TESTING

_____	Section 02223 backfill	_____	Section 02225 trenching
_____	Section 02680 paving	_____	Section 02811 irrigation sys
_____	Section 03300 concrete	_____	Section 04100 mortar
_____	Section 11306 lift stations	_____	Section 15330 fire suppression
_____	Section 15410 plumbing piping	_____	Section 15481 compressed air
_____	Section 15510 hydronic piping	_____	Section 15558 boilers
_____	Section 15682 chillers	_____	Section 15780 heat pumps
_____	Section 15780 OA Units	_____	Section 15890 ductwork
_____	Section 15975 controls	_____	Section 16121 med-voltage cable
_____	Section 16141 wiring devices	_____	Section 16170 grounding
_____	Section 16622 generators	_____	Section 16721 alarm system
_____	Section 16730 detection sys	_____	Section 16741 LAN systems

BUILDING NUMBER & STREET ADDRESS: _____

PROJECT NUMBER & TITLE: _____

CONTRACT NUMBER: _____

PROJECT MANAGER & PHONE NO: _____

CONTRACT SPECIALIST & PHONE NO. _____

DATE OF GOVERNMENT ACCEPTANCE: _____

GENERAL 0NE YEAR WARRANTY EXPIRATION DATE: _____

ONE YEAR WARRANTY INPSECTION DATE (30 days prior to expiration)_____

BRIEF DESCRIPTION OF WORK: _____

_____

_____

_____

_____

PRIME KTR, PHONE NO. & FAX NO. _____

HVAC SUBKTR, PHONE & FAX NO. _____

PLUMBING SUBKTR, PHONE & FAX NOS. _____

ELECTRICAL SUBKTR. PHONE & FAX NO'S _____

E X T E N D E D W A R R A N T I E S

SPEC.	ITEM & WARRANTY -	RESPONSIBLE PARTY (IES)
02281	Termite Treatment, 5 yrs,	Prime ktr & installer
02811	Irrigation System, 2 yr,	Prime ktr & subktr
04300	Masonry, 2 yr,	Prime ktr & subktr
07410	Preformed Metal Roofing, general, 2 yr	Prime ktr & subktr
	Panel finish, 20 year,	Manufacturer
	Leaking, 20 yr,	Manufacturer
07550	Modified Bitumen Roofing, 10 yr,	Manufacturer
07660	Sheet Metal Flashing & Trim, finish 20 yr,	Manufacturer
08330	Overhead Rolling Doors, one year plus warranty,	Manufacturer
13121	Pre-Engineered Building Systems, general, 2 yr,	Prime ktr & installer
	Siding finish, 5 yr,	Manufacturer
	Panel finish, 20 yr,	Manufacturer
	Leaking, 20 yr,	Manufacturer
15440	Plumbing, water cooler compressor, 5 yr,	Manufacturer
15450	Plumbing, water heater tank, 6 yr,	Manufacturer
15481	Compressed Air Systems, air compressor, 5 yr,	Manufacturer
15558	Finned Water Tube Boilers, boiler heat exchanger, 5 yr,	Manufacturer

E X T E N D E D W A R R A N T I E S, continued.

SPEC.	ITEM & WARRANTY -	RESPONSIBLE PARTY (IES)
15623	Forced Air Furnaces &Split System Air Conditioning,	
	5 yr compressor, 10 yr heat exchanger,	Manufacturer

15625	Fuel Fired Unit Heaters, unit heat exchanger, 5 yr,	Manufacturer
15682	Air Cooled Water Chillers, 5 yr,	Manufacturer
16531	Ballfield Lighting, 5 yr,	Manufacturer
16615	Emergency Power Supply, 5 yr,	Manufacturer

G E N E R A L I N F O R M A T I O N

SPEC	ITEM DESCRIPTION; MANUFACTURER, SPEC #, STYLE, TYPE, COLOR, ETC.
04300	Brick, _____
04300	Concrete Masonry _____
04300	Glass Masonry _____
06410	Custom Casework _____
07230	EIFS _____
07410	Prefrmd. Roofing & Access. _____
07550	Modif'd Bitumen Memb. Roofing _____
08111	Steel Doors & Frames _____
08210	Wood Doors _____
08410	Alum. Entry & Storefront _____
08520	Alum. Windows, Oper. & Fixed _____
08720	Door H'dware Latchsets _____
	Locksets _____
	Closers _____
	Exit Devices _____
09311	Cer. Tile Floor & Wall _____
09511	Susp. Acoust. Ceiling _____
09650	Resilient Floor _____
09688	Carpet _____
09900	Painting _____
10165	Plas. Lam. Toil. Part's _____
10260	Bumper, Corner & Wall Prot. _____
10440	Interior Signage _____
10800	Toil. & Bath Access. _____
12512	Mini & Vert. Blinds _____
13121	Pre-Engr. Bldg. Systems _____
16321	Distribution Transfmers. _____
16470	Panelboards _____
16475	Load Centers _____

G E N E R A L I N F O R M A T I O N, continued.

SPEC	ITEM DESCRIPTION; MANUFACTURER, SPEC #, STYLE, TYPE, COLOR, ETC.
16495	Transfer Switch _____
16496	By-pass Isolation Switch _____
16510	Interior Luminaires _____
16530	Site Lighting _____
16622	Pkg. Engine Generator Syst. _____

16721 Fire Detect. & Alarm Syst. _____

16730 Intrusion Detect. Syst. _____

I N S T R U C T I O N S

1. The prime contractor shall complete this form and provide it with the close out documentation.
2. Extended warranties; Provide name, phone and fax number for the responsible party (ies).
3. General Information; Provide name, phone and fax number, and pertinent information indicated for each item listed.
4. It may not be required to use all of the items listed under Extended Warranties and General Information, in the construction of this project. Should this occur, simply line through the item to indicate it was not used on this project.

_____ _____

Prime Contractor (See note below) Date

_____ _____

Mailing Address City, State and Zip Code

_____ _____

Phone Number Fax Number

_____

E-mail Address

If prime contractor is a corporation, affix the corporate seal below and provide signature of responsible party who can legally obligate the corporation.

SECTION 02070: SELECTIVE DEMOLITION

PART 1 GENERAL

1.01 RELATED SPECIFICATION SECTION:
A. Section 01000 – GENERAL REQUIREMENTS

1.02 SUMMARY
A. Provide all demolition as required by the contract documents.
   1. Demolish interior and exterior portions of structures including but not limited to, walls, partitions, windows, doors, roofing, paving/curb/guttering, site furniture, shrubs, trees, interior finishes, etc., and associated components.
   2. Demolish plumbing, mechanical, and electrical equipment and associated components
   3. Demolished materials shall become the property of the contractor unless otherwise noted on the drawings or in the specifications.
   4. Remove and dispose of demolished materials at a legally approved dumpsite off base.
   5. Notify Contracting Officer prior to shut-off of existing utilities. Cap off utilities that are to remain in use.
   6. Where fasteners, bolts, piping, wiring, ductwork and/or equipment that is/are to be removed are attached to or pass through walls, floors, ceilings or roofs, the contractor shall patch all holes or openings under 1(one) square foot in size to match adjacent construction. Patch holes or openings in fire rated walls as required to maintain fire rating.
   7. **Existing fire suppression systems, fire detection systems, and intrusion systems must remain active** unless approved by the Contracting Officer and the responsible agency (Fire Department/Security Forces). Required deactivation of systems, or portions thereof, during demolition/construction must be requested and approved 72 hours in advance. Contractor will be responsible for protection of premises during periods of deactivation. If necessary, provide temporary protection or services.

1.03 SUBMITTALS
A. Submit for approval selective demolition schedule, including schedule and methods for capping and continuing utility service, and clearing & grubbing schedule.

1.04 QUALITY ASSURANCE
A. Comply with governing codes and regulations. Use experienced workmen.

1.05 PROJECT CONDITIONS
A. Government personnel will not occupy areas of work during demolition.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 DEMOLITION
A. Do not damage building elements and improvements indicated to remain. Items of salvage value and not included on schedule of salvage items to be returned to Government may be removed from structure. Storage or sale of items at project site is prohibited.

B. Do not close or obstruct streets, walks, drives or other occupied or used spaces or facilities without the written permission of the Contracting Officer and the authorities having jurisdiction. Do not interrupt utilities serving occupied or used facilities without the written permission of the Contracting Officer and authorities having jurisdiction. If necessary, provide temporary utilities

C. Cease operations if public safety or remaining structures are endangered. Perform temporary corrective measures until operations can be continued properly. Complete closure of Air Force roads will not be authorized.

END OF SECTION

SECTION 02075 ASBESTOS ABATEMENT

PART 1 GENERAL

1.01 RELATED SPECIFICATION SECTIONS:

A. Section 01000 – GENERAL REQUIREMENTS

1.02 SCOPE OF WORK

A. The work required by this Section includes furnishing all required plant, labor, equipment, materials, and transportation necessary for the proper and safe removal, handling, and disposal of friable and non-friable asbestos-containing materials (ACM). Work shall be performed in accordance with applicable government regulations, as specified in this Section.

B. Asbestos-Related Work: The asbestos-related work for this contract includes the following:

- Demolition, removal, and disposal of ACM and the encapsulation of the surfaces from which ACM was removed.

- Personal, area, background, and final air clearance monitoring.

C. Additional ACM: Work areas known to contain or not to contain asbestos will be identified to the Contractor. The Contractor shall notify the Contracting Officer of any other areas suspected to contain asbestos which would be affected by the work and which was not initially identified.

1.03 CODES, PERMITS, AND STANDARDS

A. Compliance: The Contractor shall comply with applicable federal, state, and local laws, ordinances, codes, rules, and regulations. All work shall comply with applicable codes and regulations as amended. Before starting the work, the Contractor shall examine these Specifications for compliance with codes and regulations applicable to the work and shall immediately report any discrepancy to the Contracting Officer.

B. Specification/Regulation Conflicts: The current issue of each document shall govern. Where conflict among requirements or with these specifications exists, the more stringent requirements shall apply. The Contractor shall have one copy of the following regulations governing the work available for review at the site at all times:

C. Federal Regulations, Codes, and Standards:

1. TITLE 29, CODE OF FEDERAL REGULATIONS, U.S. DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) STANDARDS.

29 CFR 1926.1101	Construction Standard for Asbestos Abatement (Subpart C)
29 CFR 1910.1001	Asbestos Standard, General Industry Standard
29 CFR 1910.134	Respiratory Protection Standard
29 CFR 1910.147	Lockout/Tagout Safety Requirements
29 CFR 1910.20	Access to Employee Exposure and Medical Records
29 CFR 1910.1200	Hazardous Communication Equipment
29 CFR 1910.200	Accident Prevention Signs and Tags

2. TITLE 40, CODE OF FEDERAL REGULATIONS, U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA) STANDARDS.

Part 61, Subpart A	National Emissions Standard for Hazardous Air Pollutants - General Provisions. November 7, 1985
Part 61, Subpart M	National Emission Standards for Hazardous Air Pollutants - National Emission Standard for Asbestos. November 20, 1990
Part 763, Subpart E	Asbestos-Containing Materials in Schools

3. TITLE 49, CODE OF FEDERAL REGULATIONS, U.S. DEPARTMENT OF TRANSPORTATION (DOT) STANDARDS.

Part 171,	Hazardous Substances
Part 172,	Hazardous Materials Tables and Subparts B & C Hazardous Materials Communications Regulations
Part 173,	Shippers - General Requirements Subpart M for Shipments and Packaging

D. State Regulations, Codes and Standards:
1. Florida Requirements for Asbestos Contractors, Section 53, Chapter 469, Florida Statutes.
2. Florida Department of Environmental Protection, Asbestos Removal, Chapter 62-257, Florida Administrative Code.
3. Florida Department of Environmental Protection, Resource Recovery and Management Regulations, Chapter 62-7, Florida Administrative Code.

E. Air Force Standards:
1. AFOSH Standard. 161-4 (1985)

F. Manufacturer's Standards: The following Manufacturer's Standards shall apply, as referenced:
1. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) PUBLICATIONS:

Z9.2-79	Fundamentals Governing the Design and Operation of Local Exhaust Systems - (1979)
Z88.2-80	Practice for Respiratory Protection - (1980)
Z86.1-1973	Commodity Specification for Air. - (1972)

2. UNDERWRITERS LABORATORIES INC. (UL) PUBLICATION.

586-77	Test Performance of High Efficiency Particulate Air Filter Units
586-85	Standard for High-Efficiency Particulate Air Filter Units
467	Grounding and Bonding Equipment

3. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) PUBLICATION:

D1331-56	Surface and Interfacial Tension of Solutions of Surface-Active Agents. May 26, 1989

4. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) PUBLICATION.

70-1988	National Electrical Code (NEC) (1990)

G. Permits, State Licenses, and Notifications: The Contractor shall be responsible for obtaining necessary permits, state licenses, and certifications of personnel in conjunction with asbestos removal, hauling, and disposition and shall provide timely notification of such actions as may be required by federal, state, regional, and local authorities. The Contractor shall pay fees and/or charges for these licenses and permits. The Contractor shall submit copies of the required permits and certifications to the Contracting Officer not less than ten (10) working days prior to the start of asbestos removal.
1. At least ten (10) days prior to commencement of any asbestos removal/demolition, the Contractor shall prepare written notification in accordance with Title 40 CFR Part 61, to the agencies listed below:
   a. State Asbestos Coordinator
      Florida Department of Environmental Protection
      2600 Blair Stone Road
      Tallahassee, Florida 32399-2409
   b. Florida Department of Environmental Protection
      Northwest District
      Asbestos Program Manager
      160 Governmental Center
      Pensacola, Florida 32501-5794
   c. 16 CES/CEV
      415 Independence Road, Building 90053
      Hurlburt Field, Florida 32544-5244

Ten (10) day re-notifications are required if original start date and stop dates change. Alternate removal methods require prior approval from EPA and the Contracting Officer.

A copy of the Notification of Asbestos Renovation, Encapsulation or Demolition Project Forms and the Fee Schedule for Removal or Encapsulation Project Forms is included in the Appendix of this Section.

H. Rights and Licenses for Patented Equipment and Systems: The Contractor shall obtain all rights and licenses for use of patented equipment and/or systems that he intends to use to accomplish the work, including but not limited to negative air systems, air filtration devices and other special asbestos removal systems. The Contractor shall pay fees and/or charges for the licenses and rights to use patented equipment and/or systems.

1.04 TERMINOLOGY (The following commonly-used terms are defined in the context of these specifications)

A. Abatement: Procedures to control or decrease fiber release from asbestos-containing building materials or insulation material containing asbestos. Includes removal, enclosure, and encapsulation.

B. A-C: Asbestos-containing.

C. Asbestos-Containing Material (ACM): Any material or product which contains more than 1 percent asbestos.

D. Aggressive Sampling: Air monitoring samples collected while a leaf blower, fans, or other such devices are used to generate air turbulence within the work area.

E. Air Filtration Device (AFD): A portable, local exhaust system equipped with HEPA filtration, capable of maintaining a constant low velocity air flow into contaminated areas from adjacent, uncontaminated areas and capable of maintaining a negative air pressure with respect to the adjacent, uncontaminated areas.

F. Air Lock: A system for permitting ingress or egress to the work area while permitting minimal air movement between a contaminated area and an uncontaminated area, typically consisting of two curtained doorways placed a minimum of three feet apart.

G. Air Monitoring: The process of measuring the fiber content of a specific volume of air in a stated period of time. Personal air sampling results shall be calculated to reflect the employee's eight-hour time weighted average (TWA) exposure.

H. Amended Water: Water to which a surfactant has been added.

I. Asbestos Removal Encapsulant: A chemical solution used in place of amended water during asbestos removal to penetrate, bind, and encapsulate the asbestos-containing material.

J. Authorized Visitor: The Contracting Officer or the Contracting Officer's representatives, or representatives of any regulatory or other agency having jurisdiction over the project.

K. Competent Person: Definition and responsibilities as set down in 29 CFR 1926.1101(b) and as outlined herein.

L. Curtained Doorway: A device to allow ingress or egress from one room to another while permitting minimal air movement between the rooms.

M. Decontamination Enclosure System: A series of connected rooms for the decontamination of workers (Personnel Decontamination Enclosure System) or of materials and equipment (Equipment Decontamination Enclosure System).

N. Differential Air Pressure Recording Device: A device capable of producing a continuous strip recording, in increments of 0.001 inches of water, of the pressure differential between the containment area (work area) and the ambient air pressure.

O. Equipment Decontamination Enclosure System: A decontamination system for waste materials and equipment, typically consisting of a designated area of the work area, a washroom, and a holding area, with an air lock between any two adjacent rooms and a curtained doorway between the holding area and the non-work area. Not to be used for personnel entry/exit.

P. Encapsulant (Sealant): A liquid material which can be applied to ACM and which controls the possible release of asbestos fibers from the material, either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant).

Q. Encapsulation: Application of an encapsulant to asbestos-containing building materials to control the possible release of asbestos fibers into the ambient air.

R. Fixed Object: A unit of equipment or furniture in the work area which cannot be removed from the work area.

S. Friable: Any material which, when dry, may be crumbled, pulverized, or reduced to powder by hand pressure.

T. Full Face piece High Efficiency Respirator (FFHER): A respirator which covers the wearer's entire face from the hairline to below the chin and which is equipped with a HEPA filter.

U. Glove Bag Technique: A method of limited application for removing small amounts of friable ACM from HVAC ducts, short piping runs, valves, joints, elbows, and other non-planar surfaces. The glove bag assembly is a manufactured or fabricated device, typically constructed of 6-mil transparent plastic with two inwardly projecting, long-sleeved rubber gloves, one inwardly projecting water wand sleeve, an internal tool pouch, and an attached, labeled receptacle for asbestos waste. The glove bag is constructed and installed in such a manner that it surrounds the object or area to be decontaminated and contains (under negative air pressure) all asbestos fibers released during the removal process. All workers who are permitted to use the glove bag technique must be highly trained, experienced, and skilled in this method.

V. Government: United States Air Force.

W. Half Mask High Efficiency Respirator (HMHER): A respirator which covers one-half of the wearer's face, from the bridge of the nose to below the chin, and is equipped with HEPA filters.

X. HEPA Filter: A high efficiency particulate air (HEPA) filter capable of trapping and retaining 99.97 percent of the fibers of 0.3 micrometer or larger in diameter.

Y. HEPA Vacuum Equipment: High efficiency particulate air (HEPA) filtered vacuuming equipment having a UL 586 filter system capable of collecting and retaining asbestos fibers.

Z. Lockdown: Procedure of applying an encapsulant as a protective coating or sealant to a surface from which ACM has been removed in order to control and minimize airborne asbestos fiber generation that might result from residual asbestos-containing debris.

AA. Movable Object: A unit of equipment or furniture which can be removed from the work area.

AB. Plastic Sheeting: Six- or four-mil polyethylene sheeting.

AC. Plasticize: To cover floors and walls with plastic sheeting as herein specified.

AD. Personnel Decontamination Enclosure System: A decontamination system for personnel and limited equipment, typically consisting of an equipment room, shower room, and clean room, with an air lock between any two adjacent rooms, and a curtained doorway between the equipment room and the work area, and a curtained doorway between the clean room and the non-work area. The decontamination system serves as the only entrance/exit for the work area.

AE. Powered Air Purifying Respirator (PAPR): Either a full face piece, helmet, or hooded respirator that power-supplies breathing air to the wearer after that air has been purified through a HEPA filter.

AF. Removal: The act of removing and transporting asbestos-containing or asbestos-contaminated materials from the work area to a suitable disposal site.

AG. Surfactant: A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.

AH. Type C Respirator: A respirator which supplies air to the wearer from a source outside the work area by means of a compressor and air hose.

AI. Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning tools which have been dampened with amended water or asbestos removal encapsulant, and by afterwards disposing of these cleaning tools as asbestos-contaminated waste.

AJ. Work Area: Designated rooms, spaces, or areas of the project where asbestos abatement actions are to be undertaken, or which may become contaminated as a result of such abatement actions. A contained work area has been sealed, plasticized, and equipped with a decontamination enclosure system. A non-contained work area is an isolated or controlled-access area which has not been plasticized.

1.05 REQUIREMENTS AND QUALIFICATIONS

A. Minimum Experience: The Contractor shall have experience with abatement work, as evidenced through participation in past asbestos abatement projects.

B. Experience and Training: The Contractor's job supervisors, foremen, and workers shall be adequately trained and knowledgeable in the field of asbestos abatement. Skilled craftsmen experienced in each respective trade shall execute all phases of the work. Proof of such experience shall be submitted to the Contracting Officer upon his/her request. Improperly trained, untrained, or inexperienced personnel shall not be allowed in the work area(s). Personnel shall meet minimum training and experience requirements outlined in this Section.
   1. The Contractor's on-site job supervisor shall have successfully completed, within the last twelve months, the EPA/Florida-approved course "Supervision of Asbestos Abatement Projects" taught at an EPA/Florida-approved Asbestos Information and Training Center or at any other educational institution deemed adequate by the Contracting Officer.
   2. The job supervisors and foremen shall be thoroughly familiar with and experienced in asbestos removal and related work and shall meet the requirements of a Competent Person as specified in OSHA Standard 29 CFR 1926.1101.
   3. All asbestos abatement workers shall be knowledgeable, qualified, and trained in the removal, handling, and disposal of asbestos material, and in subsequent cleaning of the affected environment. All asbestos abatement workers shall be certified as having attended and satisfactorily completed asbestos worker training in accordance with OSHA Standard 29 CFR 1926.1101(k).
   4. The Contractor's, job supervisors, foremen, and asbestos abatement workers shall be certified and licensed as required by the State of Florida.
   5. Prior to commencement of work, all personnel who are to enter the work area shall be instructed in, and shall be knowledgeable of the appropriate procedures for personnel protection and asbestos abatement. On-site training in the use of equipment and facilities unique to this job site shall be performed. Emergency evacuation procedures from the work area shall also be included in worker training.

C. Supervision Requirements: The Contractor shall provide adequate job supervision for all phases of the asbestos abatement work.
   1. The Contractor shall have a designated job supervisor present on site whenever work described in this Section is in progress. If the job supervisor leaves the site for any reason, all work described in this Section shall be stopped. The Contracting Officer or his representative will enforce this requirement.
   2. The Contractor shall furnish one or more foremen who are familiar and experienced with asbestos removal and its related work, safety procedures, and equipment.
   3. The job supervisor and/or one or more foremen shall be required to be continually inside each work area whenever work (preparation, removal, or cleaning) is in progress.

D. Worker Medical Examinations: The Contractor shall provide medical examinations for all employees engaged in asbestos removal and disposal operations, in accordance with OSHA Standards 29 CFR 1910.134(b), 1926.1101, and applicable state regulations. The Contractor shall ensure that all employee

examination results are on file in his office and available for review and are maintained in accordance with OSHA Standard 29 CFR 1926.1101(n)(3).

E. Certificate of Worker's Release: Each asbestos abatement worker, workers of other trades, or any supervisory personnel who enter the contaminated work area shall submit an Acknowledgment of Risk by Worker, as required in the Section "Submittals". Example text for the Acknowledgment of Risk by Worker form is presented in the Appendix at the end of this Section.

1.06 SUBMITTALS

A. Unless noted otherwise, the Contractor shall submit to the Contracting Officer four (4) copies of each submittal for review and/or approval.

B. Pre-Work Information: Prior to starting work, the Contractor will be required to submit four (4) copies of the following to the Contracting Officer:
   1. Insurance coverage (policy and certificate) including liability, workmen's compensation and employer's liability. Insurance coverage shall be of the Claims Made type and include a statement that carrier understands this project is asbestos abatement work.
   2. Names of supervisory personnel and their qualifications and training, and documentation of compliance with paragraph 1.05.B of this Section.
   3. Employee training program.
   4. List of previous projects, including the Owner's name and phone number, and a listing of any citations issued by any regulatory agency over the last five (5) years to the Contractor or any of his affiliated companies. Submit list of all other company names for the last five (5) years. (If any of the above is not applicable, it should be noted).
   5. List of equipment (job related).
   6. Number of jobs under contract at this time.
   7. Description of work to be performed by subcontractor(s) and subcontractor's qualifications.
   8. Proof of licensing in the State of Florida.
   9. Name, address and telephone number of the independent testing laboratory selected to perform the sample analyses and report the results. The laboratory shall have successfully participated within the past year in the American Industrial Hygiene Association (AIHA) Proficiency Analytical Testing (PAT) Program.
   10. Proof of compliance with Paragraph 1.05, Requirements and Qualifications, of this section.

C. Pre-Work Information: The Contractor shall provide the pre-work submittal items listed herein within five (5) days after receipt of Notice of Award but not fewer than ten (10) days prior to beginning work, unless noted. Written approval of all pre-work submittals must be obtained from the Contracting Officer prior to start of any asbestos abatement work specified in this Section.
   1. Documentation of compliance with all requirements of paragraph "Requirements and Qualifications" of this Section.
   2. Proof of a respiratory protection program. Submittal shall include the level of respiratory protection intended for each operation required by the project. Submit this information on the Respiratory Protection Justification Form. A copy of this form is included in the Appendix to this section.
   3. Proof of historic airborne fiber data. Submit airborne asbestos fiber monitoring data to substantiate selection of respiratory protection proposed. Data shall include the following for each procedure required by the work:
      a. Date of measurement.
      b. Type of work task monitored.
      c. Methods used for sample collection and analysis.
      d. Number, duration, and results of samples taken.
   4. Proof of a compressor maintenance program, if Type C respiratory protection is required.
   5. Manufacturer's literature on all proposed job related equipment and products to be used. Include Material Safety Data Sheets (MSDS) for encapsulants, mastic removal products, and other chemicals to be used on this project.
   6. Certification from the encapsulant manufacturer that the encapsulant to be used is compatible with the materials and with the operating temperatures of the systems to be encapsulated.
   7. Proof of written notification and compliance with all requirements of paragraph "Permits, State License, and Notifications" of Section 1.02. Certification that all required permits have been obtained.

8. Copies of the agreements or licenses for the use of patented equipment and/or systems to be used to accomplish the work.
9. Proof that a landfill site has been located, and arrangements for transport and disposal of asbestos-containing or asbestos-contaminated materials have been made.
10. Shop drawings (with dimensions and locations) of proposed decontamination facilities and work areas. These drawings shall indicate which areas will be sealed off, proposed layout of the decontamination systems, and location of the AFD(s) and pressure differential recorder.
11. Specimen of the daily log proposed for use. Minimally, the log should include the date(s) and time(s) when all personnel enter and leave the work area(s).
12. Asbestos Abatement Plan detailing the steps and methods to be used to remove the asbestos. Plan shall also describe decontamination procedures.

D. During-Work Information: The Contractor shall provide the information described herein to the Contracting Officer at the time specified. Untimely submittal of information may be cause for halting work.
1. Results of all air monitoring performed by the Contractor shall be posted within 24 hours after collection for all workers to see.
2. Results of all air monitoring performed by the Contractor shall be reported in writing to the Contracting Officer within 24 hours after the completion of a sampling period.
3. Receipts from the landfill operator which acknowledge the Contractor's delivery(s) of material, will be submitted within three days following removal of ACM from building. Each receipt shall provide date, quantity of material delivered, and signature of authorized representative of landfill.
4. Certified, signed, and completed Waste Shipment Record Forms and Asbestos Disposal Manifest Forms shall be used for the transportation of friable ACM. Each party who has control over the asbestos waste shall sign this form, and a copy retained by each party as responsibility for the waste is transferred to the next party. An example of these forms is included in the Appendix to this Section.
5. Work Area Temperature Readings: Recordings of the temperature in the area containing the facility components at the beginning, middle, and end of each workday and keep daily temperature records, if wetting operations are suspended due to freezing temperatures.

E. Post-Work Information: The Contractor shall provide the information described herein to the Contracting Officer before final payment is authorized.
1. Notarized copies of a daily log showing the date(s) and time(s) of entrance to and exit from the work area(s) for all persons.
2. Written certification that mechanical and electrical systems disturbed by the Contractor during work under contract have been reinstalled and are in proper working order.

3. Asbestos abatement contractor shall provide the following information which will be incorporated into the Hurlburt Field Asbestos Management Database:

TYPE	CATEGORY	QUANTITY	BLDG LOCATION
Friable	Surface material	SF/LF	
Non-Friable	Thermal System Insulation		
	Other		

4. The asbestos abatement contractor shall obtain disc (digital) copies of the contract drawings in AUTOCAD 14 format, change the drawing files(s) to reflect all as-built conditions indicating the types, categories and locations of all abated asbestos.
5. Three (3) copies of the Final Clearance Reports shall be provided by the asbestos abatement contractor, two (2) copies to the Contracting Officer, and one (1) copy to the 16 Civil Engineering Squadron Environmental Flight.

1.07 TESTING REQUIREMENTS AND RESPONSIBILITIES

A. Air monitoring will be performed before, during, and after asbestos abatement to document airborne asbestos fiber concentrations. For specific requirements and responsibilities, see the section AIR MONITORING REQUIREMENTS. The Contractor shall be responsible for personal air monitoring to determine employee

exposure and the level of respiratory protection required, as well as background, area, and final clearance air monitoring. The following paragraphs identify specific Contractor responsibilities.

B. Inspections, Monitoring and Clearance Testing:
   1. The Contractor, at his expense, shall provide all tests required by specified applicable regulations, codes, and standards and any other tests for his use.
   2. From each work area an independent Certified Industrial Hygienist (CIH) or an industrial hygienist technician under direct supervision of a CIH, hired by the abatement Contractor at his expense, shall collect and analyze personal, background, area, and final clearance air monitoring samples. Sampling shall be repeated during each different work activity. Sample collection and analysis shall be performed using the OSHA Reference Method as outlined in 29 CFR 1926.1101, Appendix A.
   3. The Contractor shall be advised whenever questions arise concerning compliance with standards of quality and completeness of the work, and shall use his best efforts to resolve any such questions to the satisfaction of the Contracting Officer.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials furnished under this section shall be standard products of manufacturers regularly engaged in the production of the items and shall conform to OSHA Standard 29 CFR 1926.1101; EPA Standard 40 CFR 61, Subpart M; DOT Standards 49 CFR 171, 172, and 173; applicable state regulations; and requirements specified herein.

B. Plastic: Plastic or Polyethylene Sheet of 4-mil and 6-mil thickness shall be provided in rolls of sizes which will minimize the frequency of joints. Fire-retardant polyethylene shall be used in all gross removal areas.

C. Duct Tape: Duct tape shall be capable of sealing joints of adjacent sheets of plastic and of attaching plastic sheeting to finished surfaces without damage to existing finish and shall be capable of adhering under both dry and wet conditions, including use of amended water.

D. Surfactant: Surfactant (Wetting Agent) shall consist of resin materials in a water base, which have been tested to ensure materials are non-toxic and non-irritating to skin and eyes and are non-carcinogenic.

E. Encapsulants: Encapsulants used during this work shall be compatible with the finish materials which are to be installed on encapsulated surfaces after asbestos abatement work is completed. The encapsulant shall carry a Class "A" fire resistance rating and shall have an ASTM E-162 flame spread index of 15 or less. A tint shall be given by the Contractor to the encapsulant by means of the addition of non-toxic, nonflammable colorings before application. The encapsulant shall be installed according to the manufactures written instructions.

F. Silicone Sealant: Silicone Sealant shall be single component, solvent curing silicone sealant with 25% elongation capacity, -65°F to 450°F service range. Sealant shall be used to seal space around pipes when constructing a permanent barrier air seal. Sealant membrane shall be not less than 1/8" and not greater than 3/8" thick. Sealant shall be applied against a backer rod, fiberglass mat, or other suitable backup material. Sealant application shall be according to the manufactures written instructions.

G. Caulking Sealant: Caulking sealant shall be single component, non-sag elastomer with 1600% elongation capacity. Sealant shall meet the requirements of Federal Specification TT-S-00230C, Class A Type II. Sealant shall be used to form an airtight seal around plywood barriers or temporary partitions, to seal along the seams of the decontamination enclosure system's plywood sheathing, and to seal around piping or other small penetrations of the work area. Sealant application shall be according to the manufactures written instructions.

H. Insulation Cement: Insulation Cement shall be ASTM C 195 (100°F to 1,600°F), mineral fiber, with a thermal conductivity 0.85 maximum at 200°F mean when tested per ASTM C 177.

I. Foam Sealant: Foam Sealant shall be expanding urethane foam sealant with an ASTM E-162 flame spread index of 25 or less and an operating temperature range between -30°F and 250°F.

J. Plywood: Plywood used for temporary partitions, decontamination enclosure systems, and tunnels shall be an exterior grade and a minimum 3/8-inch thick.

K. Spray Adhesive: Spray Aerosol Adhesive shall be specially formulated to stick to sheet polyethylene (3M 76, 3M 77 or equivalent).

L. Other Materials: All other materials, such as lumber, plywood, tools, scrapers, brushes, cleaning materials, adhesive, nails, hardware, etc., which are required to perform the work described in this Section shall be provided. Materials and equipment shall be new or used, uncontaminated by asbestos, in serviceable condition, and appropriate for the intended purpose.

M. Glove Bags: Glove bags shall be manufactured of clear polyethylene material with shoulder length gloves, clear-plastic tool pouch and side port(s). Gloves shall be heat sealed to sleeves. No sewn type glove bags will be allowed. All bags shall be a minimum thickness of six mils and shall be seamless at the bottom. Glove bags shall be provided in sizes best suited for the work.

N. Disposal Bags: Plastic Disposal Bags shall be a minimum of six mils in thickness. Bags shall be labeled in accordance with Subparagraph "Warning Labels" of this Section.

O. Shipping Containers: Impermeable Containers shall be suitable to receive and retain any asbestos-containing or asbestos-contaminated materials until they are disposed of at an approved landfill. The containers shall be labeled in accordance with this Section. Containers shall be both airtight and watertight and conform to DOT Standard 49 CFR 178.224. Each container shall be constructed of fiber, hard plastic, or metal, with locking, airtight lids.

P. Warning Signs: Warning Signs shall be posted at the perimeter of the work area prior to abatement operations in accordance with OSHA Standard 29 CFR 1926.1101 (k)(6). Danger sign format and color shall conform to OSHA Standard 29 CFR 1926.200. The signs shall display the legend indicated below:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE
CLOTHING ARE REQUIRED IN THIS AREA

Q. Warning Labels: Warning Labels shall be permanently affixed to all bags and containers containing ACM's in accordance with OSHA Standard 29 CFR 1926.1101(k)(7), DOT Standard 49 CFR Part 171 and 172, and EPA Standard 40 CFR Part 61.150 (a)(1)(v). Danger label format and color shall conform to OSHA Standard 29 CFR 1926.200. DOT label format and color shall conform to DOT Standard 49 CFR 172.407. Labels shall display the following legends:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG
DISEASE HAZARD

and

RQ HAZARDOUS SUBSTANCE,
SOLID, N.O.S.
ORM-E, NA 9188
(ASBESTOS)

and

_____
(TRANSPORTER COMPANY NAME & PHONE NO.)

_____
(NAME OF FACILITY WASTE IS BEING REMOVED FROM)

_____
(ADDRESS OR LOCATION AT, WHICH THE WASTE WAS GENERATED,
INCLUDING BUILDING NO.)

R. Reuse of Containers: If impermeable containers used to transport bagged asbestos waste to the landfill are to be reused, the empty containers shall display the following label:

RESIDUE:
LAST CONTAINED ASBESTOS RQ

S. Mastic Removal Solvent: MSDS's shall be provided for any solvent proposed for use. Solvents categorized as hazardous materials are prohibited from use. 40 CFR Part 273 shall be used as the reference to determine if a solvent is hazardous.

2.02 EQUIPMENT

A. Equipment furnished under this section shall conform to applicable Federal and State regulations, local codes, and the requirements specified herein.

B. Communication Equipment: Devices suitable for inter-room communications, such as "walkie-talkies" or "radio band" communicators shall be provided, except in areas indicated by Contracting Officer.

C. Spraying Equipment: Equipment used to apply amended water or removal encapsulant shall be of a low-pressure type to prevent disturbance of the asbestos prior to physical, controlled removal. Asbestos encapsulant shall be spray-applied by airless method.

D. Air Filtration Device (AFD): For local exhaust ventilation and work area air filtration, high efficiency particulate air (HEPA) filtration systems equipped with filtration equipment which complies with ANSI Z9.2. shall be provided. Air movement systems or air filtering equipment shall not discharge unfiltered air outside the work area. A sufficient quantity of AFDs shall be used in order to provide one workplace air change every 15 minutes. To calculate the minimum total air flow movement:

$$\text{Total Cubic Feet Per Minute (CFM)} = \frac{\text{Vol. of work area in ft}^3}{\text{15 minutes}}$$

To calculate the minimum number of units needed for the abatement:

$$\text{No. units needed} = \frac{\text{Total CFM}}{\text{capacity of AFD in CFM}}$$

Work area exhaust must be sufficient to maintain the required negative pressure (vacuum) in the work area, with respect to the adjacent surrounding non-work areas. Provisions shall be made to change filters without releasing captured asbestos fibers to the surrounding areas.

E. Differential Air Pressure Recording Device: A continual strip record of the pressure differential between the work area and the adjacent non-work areas shall be provided. The strip chart shall show the time on the horizontal axis and work area vacuum on the vertical axis.

F. Vehicles: Trucks or Vans used for the transportation of asbestos waste shall be enclosed, suitable for loading, temporary storage, transit, and unloading of asbestos-contaminated waste without exposure to persons or property, and labeled in accordance with NESHAP requirements.

G. Electrical Service: Compliance with applicable standards of the National Electric Code (NEC), Underwriter's Laboratories (UL), OSHA, local building codes, and regulations governing equipment, materials, layout, and installation of temporary electric service shall be ensured by the Contractor.
   1. Temporary lighting within the work area and decontamination systems shall be provided. Minimum illumination level in the work area shall be ten foot-candles. Minimum illumination level in pedestrian tunnels, stairways, ladder runs, and decontamination enclosure systems shall be 20 foot-candles.
   2. The Contractor shall provide and use ground fault circuit interrupters on all electric power service used in the work area and in decontamination enclosure systems.

H. Fire Extinguishers: Type "ABC" dry chemical extinguishers or a combination of several extinguishers of NFPA recommended types for the fire hazard exposures in each extinguisher location shall be provided. Minimum size of extinguisher shall be 4A-60BC. Supply a minimum of one extinguisher for every 1,500 square feet of floor area, with a maximum travel distance to an extinguisher of 75-feet. Supply at least one extinguisher in each decontamination enclosure equipment room, and clean room.

I. Smoke Detectors: Smoke detectors of the battery-powered, ionization type will be required at a rate of one per 5,000 square feet, with a minimum of one smoke detector in the decontamination enclosure clean room, and one in the work area.

J. Water Filtration System: A system capable of filtering and retaining particles larger than 5.0 microns in size shall be provided.

2.03 WORKER PROTECTIVE CLOTHING AND EQUIPMENT

A. Protective clothing and equipment shall conform to OSHA Standard 29 CFR 1926.1101

B. Protective Clothing: Workers shall be provided with sufficient sets of properly fitting, full-body, disposable coveralls, head covers, gloves, and 18-inch high boot-type foot covers. Disposable coveralls, head covers, and 18-inch high boot-type foot covers shall be constructed of material equal to Dupont "TYVEK-Type 14" or Kimberly-Clark "Kleenguard", as a minimum requirement.
   1. The Contractor shall provide authorized visitors, the Contracting Officer or his representative, the CIH and the testing laboratory representative suitable, properly fitting, disposable clothing, headgear, hard hats, eye protection, and footwear (up to four sets per 8-hour shift) whenever they are required to enter the work area.

C. Equipment: The contractor must provide eye protection and hard hats required for job conditions or by applicable safety regulations.

D. Respiratory Protection: The Contractor shall be solely responsible for providing adequate respiratory protection at all times for all individuals in the work area. Types of respirators used shall be approved by MSHA/NIOSH for asbestos in accordance with OSHA Standard 29 CFR 1926.1101(h). The Contractor shall provide a level of respiratory protection which supplies an airborne fiber level inside the respirator below 0.01 fibers per cubic centimeter (f/cc), as the minimum level of protection allowed. Determine the proper level of protection by dividing the actual airborne fiber count in the work area by the "protection factors" given below for each respirator type:

Respirator Type	Protection Factor
Air purifying: Negative-pressure respirator, High efficiency HEPA filter, Half-face piece	10
Air purifying: Negative-pressure respirator, High efficiency HEPA filter,	50

Full-face piece

Powered air purifying (PAPR): Positive pressure respirator High efficiency HEPA filter, Full-face piece	100
Type C supplied air: Continuous flow Full-face piece with HEPA escape	100
Type C supplied air: Positive-pressure, Pressure-demand respirator, Full-face piece with HEPA escape	1000
Type C supplied air: Pressure-demand, Full-face piece, equipped with an auxiliary SCBA	over 1000

1. The Contractor shall provide workers with individually issued and marked respiratory equipment. Respiratory equipment shall be suitable for the asbestos exposure level(s) in the work area(s), as specified in OSHA Standard 29 CFR 1926.1101, and as more stringently specified otherwise herein.
2. Where respirators with disposable filter parts are employed, the Contractor will provide sufficient filter parts for replacement as necessary or as required by the applicable regulation.
3. Air supply for Type C respirators shall be a compressed air system providing Grade D breathing air, in accordance with OSHA Standard 29 CFR 1910.134(d)(1) and ANSI Z86.1-1973. The compressor shall be sized to accommodate the respirator manufacturer's recommendation of supply capacity and shall have a receiver of sufficient capacity to enable the respirator wearer to escape from contaminated atmosphere in the event of compressor failure. All compressed air systems shall have a compressor-failure alarm, a high-temperature alarm or shut-off, and a carbon monoxide monitor with alarm. Documentation of adequacy of the compressed air/respiratory protection system must be retained on site. This documentation shall include a list of components compatible with the maximum number and type of respirators that may be used with the system. Periodic testing of the compressed air shall be provided by the Contractor to ensure that the system provides air of adequate quality.
4. The Contractor shall have a minimum of two spare air hoses with connectors to permit the Contracting Officer or his representative, the CIH, or testing laboratory's representative to connect his assigned Type C respirator to the air system at any time without having to wait for personnel to exit the work area in order to obtain a spare hose.

2.04 DECONTAMINATION ENCLOSURE SYSTEMS

A. The Contractor shall provide a personnel decontamination enclosure system, and an equipment decontamination enclosure system in accordance with OSHA Standard 29 CFR 1926.1101, and as specified herein.

B. Structure: Use modular systems, or build using wood or metal frame studs, joists, and rafters placed at a maximum of 24 inches on-center. Interior shall be sheathed with plywood and caulked or taped airtight at joints and seams. Interior and exterior shall be lined with two layers of 6-mil plastic sheeting, with a minimum overlap of 16 inches at seams and sealed airtight by tape and adhesive. If the decontamination enclosure system is constructed outside of a building, the exterior shall be covered with plywood and the structure made weatherproof. The structure shall be capable of withstanding a minimum lateral wind load of 20 pounds/ft^2. The roof of the structure shall be capable of supporting a minimum live load of 25 pounds/ft^2. The

Contractor shall ensure compliance with local building codes and other regulations governing temporary structures.

C. Curtained Doorways: Two overlapping sheets of 6-mil polyethylene shall be placed over a framed doorway and secured along the top of the doorway. Secure the vertical edge of the outer sheet along one vertical side of the doorway and the vertical edge of the second sheet along the opposite vertical side of the doorway. The sheets shall be weighted at the bottom so that they close quickly after being released.

D. Air Locks: Air locks shall consist of two curtained doorways placed a minimum of three feet apart.

E. Personnel Decontamination Enclosure System: This system shall be the only entrance/exit for the work area. The decontamination enclosure system shall be placed adjacent to the work area and shall consist of three totally enclosed chambers and a gross clean-up system as follows:
   1. Workers' Gross Clean-up System: Just inside the work area and immediately adjacent to the equipment room, a workers' gross clean-up system will be used for removal of dust, debris, or loose material from protective clothing and footwear. This area is to be separated from the equipment room by a curtained doorway. A "hand-held" water device or shower shall be provided to facilitate the gross removal of loose material.
   2. Equipment Room: The equipment room shall have a curtained doorway to separate it from the work area (the workers' gross clean-up area), and share a common air lock with the shower room. The equipment room shall be large enough to accommodate at least one worker (allowing him enough room to remove his protective clothing and footwear), a 6-mil disposal bag in an impermeable container, and any other equipment which the Contractor wishes to store when not in use.
   3. Shower Room: The shower room shall have two adjacent air locks, one that separates it from the equipment room and one that separates it from the clean room. The shower room shall contain at least one shower with hot and cold water per eight workers. Careful attention shall be given to the shower to ensure against leaking of any kind. The Contractor shall supply shampoo and soap in the shower room at all times.
   4. Clean Room: The clean room shall share a common air lock with the shower room and shall have a curtained doorway to separate it from outside non-contaminated areas. The clean room shall be sized to adequately accommodate the work crew. Benches for seating, lockable lockers for storage of workers' street clothing, shelves for storing respirators, and a location for postings shall be provided in this area. Clean disposable clothing, replacement filters for respirators, clean dry towels, and other necessary items shall also be provided in the clean room. A hinged, lockable door shall be placed at the entrance into the clean room to prevent unauthorized access into the work area. The clean room shall not be used for storage of tools, equipment, or materials, or as office space.

F. Equipment Decontamination Enclosure System: This system is located adjacent to the work area. The equipment decontamination enclosure system, consisting of two, totally enclosed spaces, shall be constructed as follows:
   1. Equipment Washroom: An equipment washroom shall have two air locks, one adjacent to the work area and one that separates it from the holding area. The washroom shall have facilities for washing material containers and equipment. Gross removal of dust and debris from contaminated material containers and equipment shall be accomplished in the work area, prior to moving to the washroom.
   2. Holding Area: A holding area shall share a common air lock with the equipment washroom and shall have a curtained doorway to outside areas. A hinged, lockable door shall be placed at the holding area entrance to prevent unauthorized access into the work area.

G. Decontamination Enclosure System Utilities: The contractor shall provide as necessary, and as specified herein, all lighting, heat and electricity.

2.05 TEMPORARY PARTITIONS AND PEDESTRIAN TUNNELS

A. Temporary partitions shall extend from the floor to the ceiling and form an airtight seal. They shall be built using wood or metal framing at 24-inch on-center and shall be braced as necessary. Both sides of the temporary partition shall be covered with a double layer of 6-mil plastic sheeting, with joints staggered and sealed with tape. Edges of the temporary partition at the floor, walls, and ceiling shall be taped and caulked airtight.

PART 3 EXECUTION

3.01 PERSONNEL PROTECTION AND DECONTAMINATION PROCEDURES

A. General: The Contractor shall take all safety measures and precautions necessary to protect his employees and building occupants in accordance with OSHA Standard 29 CFR 1926, EPA Standard 40 CFR, Part 61, Subpart M, and applicable state regulations. The Contractor shall be solely responsible for enforcing personnel protection requirements. Table 3.1. summarizes the minimum levels of personnel protection required.

TABLE 3.1.

MINIMUM PERSONNEL PROTECTION REQUIREMENTS[a]

	RESPIRATORY ACTIVITY	DISPOSABLE PROTECTION	SHOWER REQUIRED CLOTHING	DECONTAMINATION AFTER WORK	UNIT
1.	Removal of "loose items" prior to work - no potential asbestos exposure	None	No	No	No
2.	Removal of "loose items" prior to work - potential asbestos exposure	HMHER	Yes	Yes	Yes
3.	Precleaning prior to abatement	HMHER	Yes	No	No
4.	Sealing openings prior to abatement - no potential asbestos exposure	None	No	No	No
5.	Plasticizing prior to abatement - no potential asbestos exposure	None	No	No	No
6.	Plasticizing prior to abatement - potential asbestos exposure	PAPR	Yes	Yes	Yes
7.	Gross removal	PAPR[b]	Yes	Yes	Yes
8.	Glove bag and wrap and cut removal	PAPR	Yes	Yes	Yes
9.	Asbestos-containing debris removal	PAPR	Yes	Yes	Yes
10.	A-C cement board removal	PAPR	Yes	Yes[c]	Yes[d]
11.	A-C flooring removal	PAPR	Yes	Yes	Yes
12.	Preliminary cleanup (after gross removal)	PAPR[b]	Yes	Yes	Yes
13.	Plastic removal after initial clearance	FFHER	Yes	Yes	Yes
14.	Lockdown	PAPR	Yes	Yes	Yes
15.	Cleaning and plastic removal after lockdown before final clearance	FFHER	Yes	Yes	Yes
16.	Activities after final clearance	None	No	No	No
17.	Loading ACM on truck (outside work area)	HMHER	Yes	No	No

a These are minimum requirements only. The Contractor is fully responsible for the personnel protection of all workers at the site. If conflict or interpretation differences arise, the text of the specifications apply.

b The Contractor shall furnish workers with Type C supplied air pressure demand respirators for each different work activity until the Contractor determines the 8-hour time-weighted average (TWA). After the TWA is established, the Contractor may furnish respirators as presented in the specifications, with the minimum requirement as indicated above.

c Requirement may be waived by the Engineer on an individual, case-by-case basis. Refer to text of Specifications.

d On-site for emergency use.

PAPR Full face mask powered air purifying respirator.
HMHER Half face mask high efficiency respirator.
FFHER Full face mask high efficiency respirator.

1. Workers shall be fully protected with respirators and protective clothing from the time of first disturbance of asbestos-containing or asbestos-contaminated materials prior to commencing actual asbestos abatement until final cleanup is completed.
2. Workers or authorized visitors shall not eat, smoke, drink, or chew gum or other substances while in the work area(s) or decontamination area(s).
3. Contaminated worker footwear, eye protection, and hard hats shall be stored in the equipment room when not in use in the work area and, upon completion of asbestos abatement, disposed of as asbestos-contaminated waste or decontaminated for reuse.
4. Except for Government inspectors with jurisdiction, no visitors except those authorized by the Contracting Officer shall be allowed in work area.

B. Worker Respiratory Protection: With approval from the Contracting Officer, historical airborne-fiber-level data may serve as the basis for selection of the level of respiratory protection to be used for the time interval prior to the Contractor establishing the 8-hour time weighted average (TWA) for an abatement task. Historical

data provided by the Contractor shall be based on personal air monitoring of the "breathing zone" of his employees for other asbestos abatement projects within the past 12 months, and the data were obtained during work operations conducted under workplace conditions closely resembling the processes, type of material, control methods, work practices, and environmental conditions used and prevailing in the Contractor's current operations. Documentation of aforementioned results shall be presented to the Contracting Officer for review of applicability. (See "Submittals, Pre-work Information". See the Appendix for the Respiratory Protection Justification Form.) This will not relieve the Contractor in providing personal air monitoring to determine the TWA for the work under contract. The TWA shall be determined in accordance with 29 CFR 1926.1101 Appendix A. After the TWA is established the Contractor may furnish respirators as presented in the specifications. In lieu of historical data the Contractor shall furnish for use by his workers Type C supplied air pressure demand respirators for each different work activity until the Contractor determines the TWA. After the TWA is established the Contractor may furnish respirators as presented in the specifications.

C. Decontamination Procedures for Gross Removal Operations: The following entry/exit procedures shall be used for gross removal work areas.
   1. Each worker or authorized visitor shall, upon entering the job site, remove street clothes in the clean room and put on a clean respirator (with new filters, if appropriate) and clean protective clothing before entering the work area through the shower room and equipment room.
   2. Each worker or authorized visitor shall, each time he leaves the work area, remove gross contamination from clothing before leaving the work area, proceed to the equipment room and remove all clothing except respirator, still wearing the respirator, proceed to the shower room, clean the outside of the respirator with soap and water while showering, remove filters and wet them and dispose of them in the container provided for that purpose, wash and rinse the inside of the respirator, and thoroughly shampoo and wash himself.
   3. Following showering and drying off, each worker or authorized visitor shall proceed directly to the clean room, dress in street clothes, and exit the decontamination enclosure system immediately. Disposable clothing of the type worn inside the work area is not permitted to be worn outside the work area.

D. Decontamination Procedures for Glove Bag Removal Operations: The following entry/exit procedures shall be used for areas prepared as glove bag removal work areas.
   1. Each worker shall, upon entering the job site, remove street clothes in the clean room, put on a clean respirator (with new filters, if appropriate) and clean protective clothing before entering the work area through the shower room and equipment room.
   2. Each worker or authorized visitor shall, each time he leaves the work area, HEPA vacuum his clothing before leaving the work area; proceed to the equipment room and remove all clothing except respirator, still wearing the respirator, proceed to the shower room, clean the outside of the respirator with soap and water while showering, remove filters and wet them and dispose of them in the container provided for that purpose, wash and rinse the inside of the respirator, and thoroughly shampoo and wash himself.
   3. Following showering and drying off, each worker shall proceed directly to the clean room, dress in street clothes, and exit the decontamination enclosure system immediately. Disposable clothing of the type worn inside the work area is not permitted to be worn outside the work area.
   4. The requirement for a shower may be waived by the Contracting Officer. The conditions for waver shall be that the worker did not contact ACM, a proper glove bag technique was executed, and the ACM within the work area is in good condition.

E. Authorized visitors are not required to remove street clothes and shower each time they enter and leave the work area if they only <u>observe</u> the work in progress and do not make contact with ACM. They are required to wear appropriate respiratory protection and protective clothing over their street clothing while in the work area. If they do make contact with ACM, they are required to follow the decontamination procedures for workers.

F. Decontamination of Impermeable Containers and Plastic Disposal Bags: The following procedure shall be used when removing ACM from the work area:
   1. Asbestos-contaminated materials which are likely to puncture plastic disposal bags (wire, bricks, pipe, etc.,) shall be placed in shipping containers for handling and transport to disposal site.

Other asbestos-contaminated materials may be placed in plastic disposal bags for transport to disposal site.

2. Move bagged asbestos-contaminated waste to the equipment washroom, wet clean each bag thoroughly, place each bag inside a second plastic disposal bag (and inside shipping container if applicable, and move it to the holding area pending removal to uncontaminated areas. Ensure that containers are removed from the holding area by workers who have entered the equipment decontamination enclosure system from the uncontaminated non-work area. Dress workers moving asbestos waste from the holding area onto trucks in clean coveralls of a color different than the coveralls used in the work area. Ensure that workers do not enter from uncontaminated areas into the equipment washroom or the work area. Ensure that contaminated workers do not exit the work area through the equipment decontamination enclosure system.

3.02 PREPARATION OF WORK AREA

A. Subparagraph "General Preparations" outlines procedures applicable to all enclosed work areas. Work procedures specific for preparing a gross asbestos removal area and a glove bag asbestos removal area are addressed in their respective Subparagraphs. Procedures specific for preparing an non-contained work area are addressed in its respective Subparagraph.

B. General Preparations:

1. Erect barricades; post notices and warning signs.
2. Provide and install decontamination enclosure systems in accordance with Paragraph "Decontamination Enclosure Systems" of this Section.
3. Provide a system to collect all water used by the Contractor. Collected water shall be passed through a water filtration system prior to being discharged into the sanitary sewer. The final filter shall have a pore size of 5 microns or smaller.
4. Ensure that the Contractor's communication equipment is in place, in operating condition, and in operation during work described in this Section.
5. Separate by means of airtight barriers (temporary partitions) parts of the building that are not included in the work area(s) from parts of the building that will undergo asbestos abatement.
6. Seal with temporary partitions, open doorways, cased openings, and corridors which will not be used for passage during work.
7. Isolate the area to be able to create a clean, negative pressure environment (e.g. airtight barriers).
8. Maintain emergency and fire exits from the work areas or establish alternative exits satisfactory to the local fire officials. Emergency exits and routes shall be established and clearly marked with duct tape arrows or other effective designations to permit easy location from anywhere within the work area. Emergency exits shall be secured to prevent access from uncontaminated areas and yet permit emergency exiting.
9. After sealing and plasticizing the area (see Subparagraphs "Gross Removal Area Preparations" and "Glove Bag Removal Area Preparations"), install and initiate operation of air filtration devices (see Subparagraph "Air Filtration Devices") to provide a pressure differential of at least -0.02 inches of water within the work area relative to surrounding non-work areas.
    a. Locate AFD's so that makeup air enters the work area mainly through the worker entrance and transverses the work area as much as possible. AFD's shall be exhausted to the building exterior.
    b. Once they are operational, do not shut down AFD's until the work area is released to the Government following final clearance procedures.
10. Piping systems designated for abatement work are to be shut down, cooled, and depressurized prior to any removal work.

C. Gross Removal Area Preparations: The Contractor shall perform the following preparations in conjunction with those outlined in Subparagraph "General Preparations", for each area to undergo gross removal asbestos abatement.

1. Shut down, isolate, and lock out or tag heating, ventilating, and air conditioning (HVAC) systems which serve or which pass through the work area. Vents within the work area and seams in HVAC components shall be sealed with tape and plastic sheeting. Filters in HVAC systems shall be removed and treated as asbestos-contaminated waste. Contractor shall provide the Contracting Officer with a list of locations where filters were removed.

2. Shut down, disconnect, and lock out or tag all electric power to the work area so that there is no possibility of its reactivation until after clearance testing of the work area.
3. Work Area Precleaning Procedures: After establishing the decontamination enclosure systems, prepare and preclean the work area as specified below and as indicated by the drawing notes:
   a. Movable and loose items not removed by the Government from work areas shall be cleaned using HEPA vacuum equipment and/or wet cleaning methods as appropriate and shall be removed from work areas to a location designated by the Contracting Officer or his representative. These items will be received by the Government.
   b. Movable and loose items noted as being contaminated shall be removed from the work areas and discarded as asbestos-contaminated waste.
   c. Fixed objects within the work area shall be precleaned using HEPA vacuum equipment and/or wet cleaning methods as appropriate. Joints of covers or casings shall be sealed with tape and fixed objects enclosed with a minimum of two layers of 6-mil plastic sheeting sealed airtight with tape. Disassembly of these fixed objects is not required unless otherwise noted.
   d. Existing pipe insulation which does not contain asbestos materials and is to remain shall be cleaned using HEPA vacuum equipment and/or wet cleaning methods as appropriate prior to being wrapped and sealed airtight in two layers of 4-mil plastic sheeting.
   e. Prior to being plasticized, the work areas shall be cleaned using HEPA vacuum equipment and/or wet cleaning methods as appropriate. Methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters, shall not be used.
4. Plasticize the area after precleaning, using the following procedure:
   a. Cover floor with one layer of 6-mil plastic sheet, turning layer a minimum of 16 inches up wall, and seal layer to wall.
   b. Cover walls with one layer of 4-mil plastic sheet, lapping wall layer a minimum of 16 inches, and seal layer to floor layer.
   c. Repeat procedure for second layer. All joints in plastic sheets shall be glued and taped in such a manner as to prohibit air passage. Joints on plastic layers shall be staggered to reduce the potential for water to penetrate.
5. Areas immediately adjacent to removal areas, such as corridors or hallways which are not in work areas but are necessary routes to and from work areas, shall be protected with two layers of 6-mil plastic sheeting on floors and two layers of 4-mil plastic sheeting on walls and ceilings. The Contractor is permitted to provide plastic-enclosed, framed-in tunnels in lieu of plasticizing walls and ceilings. Openings from these areas into areas where asbestos material is removed shall have curtained doorways to minimize fiber dispersal into adjacent areas.

D. Glove Bag Removal Area Preparations: The following preparations shall be performed in conjunction with those outlined in Subparagraph "General Preparations" for areas to undergo glove bag removal asbestos abatement.
1. Shut down, isolate, and lock out or tag heating, ventilating, and air conditioning (HVAC) systems which serve or which pass through the work area. During the work, vents within the work area shall be sealed with tape and plastic sheeting. Filters in HVAC systems shall be removed and treated as asbestos-contaminated waste. The Contractor shall provide the Contracting Officer with a list of locations where filters were removed.
2. Shut down, disconnect, and lock out or tag all electric power to systems on which glove bag removal will take place.
3. Work area precleaning procedures:
   a. Movable and loose items not removed by the Government from work areas shall be cleaned using HEPA vacuum equipment and/or wet cleaning methods as appropriate and shall be removed from work areas to a location designated by Contracting Officer. These items will be received by the Government.
   b. Preclean any gross contamination, from the immediate work areas using HEPA vacuum equipment and/or wet cleaning methods as appropriate. Methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters, shall not be used.
   c. Fixed objects within the work area shall be precleaned using HEPA vacuum equipment and/or wet cleaning methods as appropriate.
4. Cover all horizontal surfaces within ten feet of the glove bagging operation, including the floor, with one layer of 6-mil plastic sheet.
5. Prepare insulation sections to be removed as follows:

a. If insulation is damaged, or if a complete pipe section is being removed, wrap the entire length of the pipe in polyethylene plastic and "candy-stripe" it with duct tape.
b. If insulation is not damaged, place one layer of duct tape around the pipe at each location where the glove bag will be attached.
c. For punctures through pipe lagging, or other areas of limited damage, place one layer of duct tape securely over damaged area.

E. Non-Contained Work Area: In areas where the construction of a sealed, enclosed work area is impracticable, the following preparations shall be performed:
1. Provide a roped-off perimeter around the area where the ACM is to be removed and handled. Post notices and warning signs around the perimeter of the work area.
2. Provide a decontamination enclosure system adjacent to the work area, in accordance with Paragraph "Decontamination Enclosure Systems" of this Section.
3. Provide a system to collect all water used by the Contractor. Collected water shall be passed through a water filtration system prior to being discharged into the sanitary sewer.
4. Seal with plastic and tape all doorways, windows, vents and other openings in the walls of the facility adjacent to the work.
5. Cover all horizontal surfaces within ten feet of the removal operation, including the ground, with one layer of 6-mil plastic sheet.

3.03 PRE-REMOVAL INSPECTION

A. Prior to removal of any ACM the Contracting Officer or his representative shall perform a pre-removal inspection. The Contracting Representative shall be notified 24 hours prior to the inspection. Posting of warning signs, construction of temporary partitions, plasticizing of work area, building of personnel and equipment decontamination enclosure systems, and all other preparatory steps shall have been taken prior to notification of the Contracting Officer. The Contractor shall not begin asbestos removal until the Contracting Officer approves the work area preparations.

3.04 MAINTENANCE OF ENCLOSED WORK AREA AND DECONTAMINATION ENCLOSURES

A. Ensure that barriers and plastic linings are effectively sealed and taped. Repair damaged barriers and remedy defects immediately upon their discovery. Visually inspect enclosures at the beginning and end of each work period. Use smoke methods when directed by the Contracting Officer or his representative to test effectiveness of barriers.

B. Thoroughly clean the decontamination enclosure systems at the end of each 8-hour work shift, and more frequently if required.

3.05 REMOVAL OF ASBESTOS-CONTAINING MATERIAL

A. A-C Ceiling Material, Vibration Isolators, and Insulation and Lagging on Tanks, Pipes, Fittings, Other Equipment and Ductwork: The Contractor may use the "gross removal" procedure described below. The Contractor shall use methods and equipment which will keep the fiber count during removal operations to less than 0.5 fibers/cc of air when tested by NIOSH Method 7400.
1. Gross removal procedure:
a. Prepare the area as described in Subparagraph "Gross Removal Area Preparations" of this Section. Remove aluminum lagging from piping and equipment, if present, while providing a continual mist of amended water or removal encapsulant to the insulation, leaving it intact. Spray asbestos materials with a fine mist of amended water or removal encapsulant, saturating materials to substrate. Spray the asbestos material repeatedly during work process to maintain a wet condition and to minimize asbestos fiber dispersion.
b. Remove the saturated asbestos material in small sections. As it is removed, pack the material in sealable plastic bags which shall be placed in labeled drums for transport. Remove insulation materials carefully from equipment. Do not permit them to fall to the floor.
2. After completion of all stripping work, surfaces from which ACM have been removed shall be wet brushed and sponged, or cleaned by some equivalent method to remove all visible residue. (Do not use wire brushes.)

B. A-C Insulation and Lagging on Pipes and Fittings: The Contractor shall use the procedure as described below when using the glove bag technique for the removal of ACM from piping and small tanks. The

Contractor shall use methods and equipment which will keep the fiber count during removal operations to less than 0.1 fibers/cc of air when tested by NIOSH Method 7400.

1. Prepare the area as described in Subparagraph "Glove Bag Removal Area Preparations" of this Section. For removal of ACM using the glove bag technique where the establishment of a sealed enclosed work area is impracticable, prepare work area as described in Subparagraph "Non-Contained Work Area".
2. Place the glove bag around the affected section of pipe, secure the glove bag, and reinforce the attachment/seal. Glove bags shall provide an airtight seal around the area from which the asbestos is to be removed and shall be under negative air pressure by a HEPA filter exhaust unit. Check for leakage by introducing smoke into the bag and then gently squeezing the bag with hand pressure. If any leaks occur, the bag shall be resealed and retested until no leakage occurs. This seal shall be continually maintained until all asbestos has been removed from the equipment surface enclosed within the glove bag.
3. If the section of pipe is covered with an aluminum jacket, this is removed first. It is important to fold in the sharp edges of the jacket to prevent cutting the bag when it is placed in the bottom. With the insulation exposed, cut the insulation inside the glove bag at each end of the section to be removed. Slit insulation from end to end and remove insulation from pipe. Throughout this process spray water on the cutting area to keep dust to a minimum.
4. When all insulation is removed, introduce water spray into the glove bag and carry out recommended washing-down procedure (tools, pipe, and upper half of bag). Scrub and wipe down the exposed pipe inside the glove bag. Apply lockdown sealant to all exposed insulation and pipe.
5. When the above operations have been completed, remove excess air from the glove bag with HEPA vacuum and remove the glove bag from pipe. Continuous stripping or sliding of the glove bag shall not be allowed. Use the glove bag for only one application prior to disposal. Place the glove bag in a plastic disposal bag and seal the bag prior to placing it in a labeled drum for transport.

C. Abandoned Pipes and Fittings with A-C Insulation and Lagging: Note that all piping scheduled for demolition shall be purged prior to cutting. The Contractor may use the wrap-and-cut technique on these materials. The Contractor shall use methods and equipment which will keep the fiber count during removal operations to less than 0.1 fibers/cc of air when tested by NIOSH Method 7400.
   1. Prepare the area as described in Subparagraph "Glove Bag Removal Area Preparations" of this Section.
   2. Using the glove bag removal technique described in Subparagraph "Insulation and Lagging on Pipes and Fittings," remove stripe of insulation along the pipe to be demolished. Width of the strips should be sufficient for the use of power cutting equipment to cut the pipe while leaving the remaining insulation undisturbed.
   3. Spray aerosol adhesive on the insulated pipe and wrap it airtight in one (1) layer of 6-mil plastic sheet. Cut the pipe at exposed strips. Remove the pipe section and wrap it in a second layer of 6-mil plastic sheet. Secure plastic with duct tape prior to placing the pipe sections in labeled drums for transport and disposal.

D. A-C Debris: The Contractor shall use methods and equipment which will keep the fiber count during removal operations to less than 0.1 fibers/cc of air when tested by NIOSH Method 7400.
   1. Prepare the area as described in Subparagraph "Glove Bag Removal Area Preparations" of this Section.
   2. Spray debris with amended water or removal encapsulant. While still wet, place loose pieces in 6-mil plastic bags and pack bags in labeled drums for transport.
   3. If breaking is required to reduce the bulk size for disposal, wrap debris airtight in two layers of 6-mil plastic sheeting. Break while contained inside plastic layer. Pack into an additional plastic disposal bag and place in labeled drums for transport.

E. A-C Cement Board: For removal of non-friable asbestos cement products, prepare work area as described in Subparagraph "Glove Bag Removal Area Preparations" of this Section. The Contractor shall use methods and equipment which will keep the fiber count during removal operations to less than 0.1 fibers/cc of air when tested by NIOSH Method 7400.
   1. The A-C cement board shall be kept saturated with amended water during removal, and removed intact if possible, in order to minimize emission of airborne fibers.

2. Fasteners holding material in place shall be cut or removed without breaking the material. Spray amended water on and around the fastener while removing it to control any fiber release.
3. If removal of fastener is unsuccessful, under a continual mist of amended water break A-C cement board from under the fastener.

F. A-C Flooring and Mastic: The work area shall be prepared as described in Subparagraph "Gross Removal Area Preparations" of this Section. If A-C flooring and/or A-C mastic is the only ACM to be removed in a work area, modify area preparations to include the following: (1) plasticize the walls to a height of three feet to protect them from water damage and (2) do not plasticize floor area. The Contractor shall use methods and equipment which will keep the fiber count during removal operations to less than 0.1 fiber/cc of air when tested by NIOSH Method 7400.
1. Dispose of any removed carpet and baseboard materials as asbestos waste.
2. Spray amended water onto floors covered with A-C flooring. Wet the material sufficiently to reduce the release of fibers if the materials are broken upon removal. Remove A-C flooring using a flat hoe or scraper. Flooring shall be removed intact. Continually wet the material during the removal process to minimize fiber dispersion. Do not grind or sand floor. Multiple layers of flooring may exist.
3. Remove A-C mastic using a flat hoe, approved mastic-removal solvent, or other suitable method. Do not grind or sand A-C mastic.
4. As material is removed, wrap it in two layers of plastic and place it in labeled containers for transport. After completion of all stripping work, scrape, wet-brush, and wipe floor. No tile or mastic residue shall remain on the floor surface following removal and cleaning.

G. A-C Painted Panels and Wallboard: For removal of non-friable asbestos-painted products and wallboard, prepare work area as described in Subparagraph "Glove Bag Removal Area Preparations" of this Section. The Contractor shall use methods and equipment which will keep the fiber count during removal operations to less than 0.1 fibers/cc of air when tested by NIOSH Method 7400.
1. The A-C painted panels shall be kept saturated with amended water during removal, and removed intact if possible, in order to minimize emission of airborne fibers.
2. Fasteners holding material in place shall be cut or removed without breaking the material. Spray amended water on and around the fastener while removing it to control any fiber release.

H. Additional Removal Requirements:
1. The Contracting Officer or his representative shall issue a stop work order should the fiber count in work areas exceed the maximum allowable fiber concentrations specified. The Contracting Officer or his representative shall stop work in work areas should the fiber count in adjacent non-work areas exceed 0.01 f/cc of air or the background count (use the greater of these two values as the reference). Work shall not resume until the condition(s) causing the increase are corrected by the Contractor and the Contractor receives written notice from the Contracting Officer.
2. The following refers to asbestos contamination which occurs accidentally in an area prepared in accordance with Paragraph "Glove Bag Removal Area Preparations". Each project activity in the work area shall be immediately discontinued if asbestos contamination of the general work area occurs as a result of damage to or improper use of glove bags or damage to any other friable ACM located within the area. Project activities shall not be resumed until all surfaces in the area that are likely to have become contaminated with asbestos fibers have been thoroughly cleaned with a HEPA vacuum or by wet cleaning methods. The Contractor shall notify the Contracting Officer immediately of all emergency shutdown actions. Asbestos removal work shall not resume until the Contractor receives written notice from the Contracting Officer.
3. Removal of ACM at penetrations of walls and concrete slabs shall extend not less than three inches beyond the surface of the wall or slab. The remaining exposed end of insulation not removed shall be sealed with penetrating encapsulant. The remaining hole shall be filled with insulating cement or foam sealant as directed by the Engineer.
4. At the termination of asbestos removal on piping and equipment, encapsulate the exposed edges of remaining asbestos insulation. Wet and cut the rough ends true and square with sharp tools and enclose the edges with a 1/4-inch-thick layer of insulating cement trowelled to a smooth, hard finish. When the insulating cement is dry, lag the end with a layer of fiberglass cloth and thermal insulation adhesive, overlapping the existing ends by four inches.

3.06 CLEANUP AND CLEARANCE TESTING OF WORK AREAS

A. Clearance Procedure for areas prepared as "Gross Removal" areas: Cleaning of the work areas and other contaminated areas shall be conducted in accordance with the four-step procedure described below.

Step 1.	Preliminary Cleanup	Visual inspection
Step 2.	Initial Clearance Testing	Visual inspection and fiber count <0.05 fiber/cc of air, using NIOSH Method 7400.
Step 3.	Lockdown	---
Step 4.	Final Reoccupancy Clearance	Visual Inspection and fiber count of <70 structures/sq millimeter, using TEM analysis; .45 Micron (pore size); 5 samples/area min.; In accordance with 40 CFR 763 Subpart E, Appendix A.

1. Step 1. Preliminary Cleanup:
   a. Remove visible accumulation of asbestos material and debris. Wet clean all surfaces and objects in the work area and any other contaminated area. Remove asbestos waste in impermeable containers from the work area.
   b. After cleaning the work area, wait 24 hours to allow for the settlement of dust and again wet clean, or clean with HEPA vacuum equipment, all surfaces in the work area. (Waiting time of 24 hours may be waived.) After completion of the second cleaning operation, perform a complete visual inspection of the work area to ensure that it is free of visible contamination.
   c. The Contracting Officer or his representative will perform a visual inspection. If the Contracting Officer or his representative finds visible accumulations of dust in the work area, the Contractor shall repeat the wet cleaning as heretofore specified.

2. Step 2. Initial Clearance Testing:
   a. The Contractor's industrial hygienist or his representative will perform Initial Clearance Testing in work area.
   b. Areas which do not comply with Initial Clearance Testing criteria shall continue to be cleaned by the Contractor until the specified standard of cleaning is achieved. Initial Clearance Testing results shall be submitted to the Contracting Officer in accordance with paragraph 1.06.D.
   c. When the fiber count is acceptable, one layer of plastic sheeting shall be carefully removed from ceilings, walls, and floor (if two layers are present). The plastic sheeting shall be folded inward as it is removed to trap any debris. Plastic sheeting and seals on doors, windows, vents, and other openings shall remain in place.

3. Step 3. Lockdown:
   a. After successful completion of the Initial Clearance Procedure, all surfaces and building components from which ACM was removed (ceilings, piping, and floors) and the remaining layer of protective plastic sheeting shall receive lockdown encapsulant.
   b. When the encapsulant is dry, the layer of plastic sheeting shall be wet cleaned and/or HEPA vacuumed again
   c. The second layer of plastic shall be removed from walls and floor and shall be folded inward to trap any debris. Do not remove seals from doors, windows, etc. or turn off the AFDs.
   d. All exposed surfaces shall be wet cleaned and/or HEPA vacuumed. After cleaning, wait a minimum of 16 hours to allow for settling of dust and then wet clean and/or HEPA vacuum again. (Waiting time of 16 hours may be waived by the Contracting Officer.)

4. Step 4. Final Reoccupancy Clearance:
   a. The Contracting Officer or his representative will perform a final inspection for reoccupancy for the purpose of observing whether the condition of cleaned areas is free of dust, dirt, and debris. Evidence of asbestos contamination identified during the inspection will necessitate further cleaning as heretofore specified.

b. When the work area passes the final inspection for reoccupancy, the Contractor shall test for reoccupancy using aggressive sampling techniques. Reoccupancy will be approved by the Contracting Officer if the recommended fiber count in the work area is achieved. Failure to achieve this level will necessitate further cleaning as heretofore specified. Final Air Clearance results shall be submitted to the Contracting Officer in accordance with paragraph 1.06.D.

c. When the work area passes the reoccupancy test, disconnect the AFDs, and seal the intakes to the machines airtight with 6-mil plastic sheeting and tape. Remove all controls and seals established.

B. Clearance Procedure for areas prepared as "Glove Bag Removal" areas: For areas in which glove bag removal area preparation was required, cleaning of the work areas and other contaminated areas shall be conducted in accordance with the three-step procedure described below.

Step 1.	Preliminary Cleanup	Visual Inspection
Step 2.	Lockdown	--
Step 3.	Final Reoccupancy Method 7400.	Fiber count of <0.01 fiber/cc of Clearance air, using NIOSH

1. Step 1. Preliminary Cleanup:
   a. Remove any visible accumulation of asbestos material and debris. All sealed drums, plastic bags, and equipment used in the work area shall be removed from the work area.
   b. The Contracting Officer or his representative will perform a visual inspection. Evidence of asbestos contamination identified during the inspection will necessitate further cleaning as heretofore specified.

2. Step 2. Lockdown: (For glove bag removal, this step should have already been completed with the glove bag still on the pipe).
   a. When the work area passes the Preliminary Cleanup, all building materials and components from which ACM was removed, as well as protective layer of plastic sheeting, shall receive a lockdown encapsulant.
   b. When the encapsulant is dry, plastic sheets on the walls and floors shall be removed. Do not remove seals from doors, windows, etc. or turn off the AFDs.

3. Step 3. Reoccupancy Clearance:
   a. The Contractor shall test for reoccupancy using aggressive sampling techniques. Reoccupancy will be approved by the Contracting Officer or his representative if the specified fiber count in the work area is achieved according to the testing laboratory. Final air clearance monitoring results shall be submitted in accordance with paragraph 1.06.D.
   b. When the work area passes the reoccupancy test disconnect the AFDs, and seal the intakes to the machines airtight with 6-mil plastic sheeting and tape. Remove all controls and seals established.

C. Other Information:
   1. Extra time required to clean work areas in order to achieve clearance criteria shall not be considered grounds for an extension of time for contract completion.

3.07 AIR MONITORING REQUIREMENTS

A. Air monitoring will be performed before, during, and after asbestos abatement to document airborne asbestos fiber concentrations. Air sampling shall be conducted under the direction of an independent Certified Industrial Hygienist (CIH) or a Industrial Hygienist Technician (IHT) under direct supervision of the CIH experienced in asbestos abatement and who is currently certified in the comprehensive practice of industrial hygiene by the American Board of Industrial Hygiene (ABIH). The Contractor shall be responsible for the development and implementation of a personal air monitoring program in accordance with OSHA Standard 29 CFR 1926.1101, good industrial hygiene practices, and the requirements herein for gross removal and/or glove bag removal, including background, area, and final air clearance air sampling.

1. Air Monitoring Prior to Asbestos Work. The baseline air sampling shall be established one day prior to the masking and sealing operations for each abatement area site. The background shall be established by performing area sampling in similar but uncontaminated sites in the building. PCM air samples shall be collected at a minimum of three locations. These locations are: outside the building, inside the building not within the abatement area, and inside each abatement area. One sample shall be collected for every 2000 square feet of floor space for the inside samples. At least two samples shall be collected outside the building. Air monitoring results shall be submitted to the Contracting Officer in accordance with paragraph 1.06.D.
2. Air Monitoring During Removal Operations:
   a. Full-shift daily personal exposure air sampling of workers shall be performed to establish the 8-hour (TWA) exposure. Such sampling shall be conducted for each employee (or representative group of employees) expected to receive the highest exposure in each work area for each type of activity that removal, cleanup, or site preparation activities occur. Similarly, 30-minute personal exposure air sampling shall be conducted during activities anticipated to produce the highest airborne concentrations to determine the excursion limit (EL). The Contractor shall notify the Contracting Officer immediately of any exposures to asbestos fibers within the asbestos control area in excess of 0.1 f/cc (PEL) or the 1.0 f/cc (EL), without regard to respiratory protection. All air monitoring results shall be submitted to the Contracting Officer in accordance with paragraph 1.06.D.
   b. Area sampling shall be conducted at least every shift. Samples shall be taken within the containment area, outside the clean room entrance, inside the clean room, outside the load-out unit exit, and other areas surrounding the containment including the exhaust discharge point of the local exhaust system. Monitoring stations shall not be positioned in such a manner that will generate false results (e.g. within direct line of the exhaust system, facing upward). If monitoring anywhere outside the asbestos control area (barrier/perimeter, environmental, and clean room air samples) indicates airborne concentrations in excess of 0.01 f/cc or the reference background fiber concentration, whichever is greater, the Contractor shall immediately notify the Contracting Officer. The Contractor shall immediately stop the removal of asbestos, investigate, and correct the condition causing the increase. All area monitoring results shall be submitted to the Contracting Officer in accordance with paragraph 1.05.C.
3. Air Monitoring After Removal Operations (Final Air Clearance). Final Air Clearance shall be performed as specified in Section 3.06, and submitted in accordance with paragraph 1.06.D.

B. Recordkeeping: The Contractor shall keep and maintain accurate records of all air monitoring performed during this project in accordance with OSHA Standards 29 CFR 1926.1101. The Contractor shall complete and submit to the Contracting Officer within 15 working days after completion of all airborne asbestos monitoring conducted under this contract, the following (this is in addition to the daily submittal of the air monitoring results required by Section 1.06.D:
   1. Negative air pressure readings, signed and dated.
   2. Detailed background, personal, clearance, and area air monitoring records, signed and dated.

3.08 DISPOSAL AND TRANSPORTATION OF ASBESTOS-CONTAMINATED WASTE

A. As the work progresses, to prevent exceeding available storage capacity on site or to prevent stacking of drums, remove sealed and labeled drums or bags of ACM from the work area as required.

B. Sealed and labeled drums or bags shall be used to transport asbestos- contaminated waste to the landfill. Procedures for hauling and disposal shall comply with 40 CFR Part 61, 49 CFR Part 171 and 172, and other applicable state, regional, and local government regulations. Procedures for removal from the work area and disposal of waste are outlined below:
   1. Asbestos-containing waste shall remain under the positive control of the Contractor and must never be left unattended in an area or on a vehicle where unauthorized persons could gain access. When control of the asbestos waste is relinquished to another party, the signature of both parties, and the time and date of the transaction, shall be recorded on the Waste Shipment Record form. Each party who has control over the asbestos waste shall retain a copy of the waste shipment record form, as the responsibility for the waste is transferred to the next party. Copies of all waste shipment record forms and waste receipts shall be provided to the Contracting Officer.
   2. Trucks hauling drums or bags shall be totally enclosed to prevent loss or damage to waste containers en route to approved landfill. The interior of the vehicles shall be lined with two layers of 6-mil plastic.

3. All vehicles used to transport the waste material shall be marked with a visible warning sign during the loading and unloading of asbestos-containing waste. Danger sign legend, text size, style and arrangement shall conform to the requirements of 40 CFR Part 61.149 (d)(1).
4. Only sealed plastic bags or drums are permitted to be deposited in landfill. Damaged, broken, or leaking plastic bags shall remain in the drum, and the drum shall be deposited in landfill. Broken bags shall be rebagged prior to disposal. Workers shall place asbestos waste in the landfill. Throwing or dumping of containers shall not be allowed. Workers unloading and handling the sealed bags/drums at the disposal site shall wear appropriate personnel protective equipment including respirators and protective clothing.
5. After the vehicle is unloaded at the landfill, the plastic sheeting that was taped to the floor, sides and top of the truck shall be carefully removed and placed in properly labeled bags for disposal with the rest of the waste.

3.09 RE-ESTABLISH MECHANICAL AND ELECTRICAL SYSTEMS

A. Mechanical and Electrical Systems: After final clearance of the work areas, re-establish HVAC, mechanical, and electrical systems disconnected or removed to perform asbestos abatement. The Contractor shall certify in writing that all systems disturbed or removed during this work have been reinstalled and are in proper working order.

B. Mounted Objects: When finishes have been completed the Contractor shall resecure mounted objects removed during the course of the work to their former positions.

C. Loose and Movable Objects: Objects cleaned and removed from the work area by the Contractor shall be returned to their former positions by the Contractor.

END OF SECTION

SECTION 02075 APPENDIX

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RESPIRATORY PROTECTION JUSTIFICATION

Project Name _____

Location _____

Date _____

Based upon airborne asbestos fiber counts encountered on previous projects of similar type working on materials similar to those found on the above-referenced project, the following level of respiratory protection is proposed for the indicated operations to maintain an airborne fiber concentration below 0.01 fibers per cubic centimeter (f/cc) exposure limit inside the respirator facepiece.

Anticipated Operation	Respiratory f/cc	Protection Protection	f/cc in Factor	Mask
Installing sheet plastic				
Removing objects in contact with ACM				
Gross removal of pipe, duct, & tank insulation				
Glove bag removal of pipe run & fitting insulation				
Removal of asbestos cement products				
Removal of floor tile				
Removal of flexible duct joints				
Gross debris removal				
Cleaning "primary" sheet plastic				
Cleaning "critical" barrier				
Removing decontamination unit				
Disposal at landfill				
Other				

The Contractor certifies that to the best of his knowledge and belief the above represent a true and accurate representation of airborne fiber concentrations expected for the operations indicated, and are based upon airborne fiber data from past projects with similar materials and operations.

Contractor _____

Signed by:

Signature _____ Date _____

Print Name _____

Title _____

Notification of Demolition and Renovation

Get form from Environmental Section, 16 CES or the Florida Dept of Environmental Protection

Certificate of Worker's Release

Get form from Environmental Section, 16 CES or the Florida Dept of Environmental Protection

Waste Shipment Record Form, with Instructions

Get form from Environmental Section, 16 CES or the Florida Dept of Environmental Protection

SECTION 02110: SITE CLEARING & GRADING

PART 1 GENERAL

1.01 RELATED SPECIFICATION SECTIONS:
A. Section 01000 -- GENERAL REQUIREMENTS

1.02 SECTION INCLUDES
A. Remove surface debris.

B. Clear site of plant life and grass.

C. Remove trees and shrubs.

D. Remove root system of trees and shrubs.

E. Topsoil excavation.

F. Site Grading

1.03 REGULATORY REQUIREMENTS
A. Conform to applicable regulations and local ordinances for disposal of debris off Base.

B. Coordinate clearing Work with utility companies.

1.04 QUALITY ASSURANCE
A. Use skilled workman who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the particular requirements of the project and the methods needed to accomplish same.

B. Use equipment adequate in size, capacity and numbers to accomplish the work in a timely manner.

PART 2 PRODUCTS
A. Fill Materials, See section 02223, Backfilling.

B. Weed Killer: Provide a dry, free-flowing, dust free chemical compound, soluble in water, capable of inhibiting the growth of weeds and other undesirable vegetation and approved for use on base by governmental agencies having jurisdiction.

C. Topsoil: Use stockpiled topsoil or provide topsoil consisting of friable, fertile soil of loamy character, containing an amount of organic material normal to the region. Topsoil shall be capable of sustaining healthy plant life and be reasonably free from subsoils, roots, heavy or stiff clay, stones larger than 2" in greatest dimension, weeds, sticks, brush and other deleterious material.

PART 3 EXECUTION

3.01 PREPARATION
A. Verify that existing plant life designated to remain is tagged or identified.

B. Examine the areas and conditions under which work of this section will be performed. Correct conditions detrimental to the timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.02.1 PROTECTION
A. Protection of Person and Property.
   1. Barricade open holes and depressions occurring as part of this work and post warning lights or safety flagging as required.
   2. Operate warning lights during the hours from dusk to dawn each day and as otherwise required.
   3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, washout, and other hazards caused by the work of this section.

B. Locate, identify, and protect utilities that are to remain and protect from damage. If active utility lines are encountered that are not shown on the drawings or otherwise made known to the contractor, immediately notify the Contracting Officer and request instructions prior to proceeding with the work.

C. If existing utility services are interrupted as a result of work under this section, immediately restore service by repairing the damaged utility at no cost to the government.

D. Protect trees, plant growth, and features designated to remain, as final landscaping.

E. Protect benchmarks, permanent reference monuments and existing structures from damage or displacement. A Florida Registered Surveyor at no cost to the government shall replace damaged or destroyed benchmarks or permanent reference monuments. Damage to existing structures shall be repaired to the satisfaction of the Contracting Officer at no additional cost to the government.

3.03 CLEARING

A. Clear areas required for access to site and execution of work.

B. Remove trees and shrubs within marked areas. Remove stumps and main root ball.

3.04 MERCHANTIBLE TIMBER DESIGNATED FOR REMOVAL

A. All trees containing merchantable timber will remain the property of the government. If the government representative from the Natural Resources Branch, AAC/EMSN, determines that there are sufficient quantities of trees on the construction site, the contractor will fell, trim stump, limbs and tops and stockpile tree length in an orderly manner at an accessible location on-site or directly off-site, where it will not impede progress of the contract. The stockpile area shall be pre-approved by the Contracting Officer. The government will determine the type and quantities of merchantable timber prior to clearing the site. The government shall by separate contract, harvest the merchantable stockpiled timber. All timber or trees considered **not merchantable** by the government shall be considered construction debris.

B. All non merchantable timber, stumps, limbs, roots and other debris on the project site shall become the property of the contractor and shall be removed from the project site and disposed of properly at a location off base.

C. All felled timber, 5 inches in diameter at a height of 5 feet above grade, from which saw logs, pulpwood, posts, poles, ties, cordwood or mine props, can be produced shall be considered merchantable timber unless otherwise directed by the government representative.

3.05 REMOVAL

A. Remove debris, rock, and extracted plant life from site and dispose of properly at an off base location.

3.06 TOPSOIL EXCAVATION

A. Excavate topsoil from areas to be further excavated and stockpile for later use, re-landscaping or finish grading.

B. Excess topsoil, and subsoil, not being reused shall become the property of the contractor and removed from the site.

3.07 SITE GRADING & COMPACTION

A. Grading
   1. Uniformly grade those areas within the limits of construction including adjacent transition areas.
   2. Smooth the finished surface within specified tolerances with no irregular surface changes.
   3. Where a change of slope is indicated on the drawings, construct a rolled transition section between the slopes, unless adjacent construction will not permit such a transition or if the transition defeats positive control of drainage.
   4. Grade areas adjacent to buildings to achieve positive drainage away from the buildings and to prevent ponding.
   5. Shape the surface areas to line, grade, and cross-section with finished surface not more than 0.05' above/below the required subgrade elevation.

B. Compaction: See section 02223, Backfilling.

3.08 MAINTENANCE

A. Protect newly graded areas from traffic and erosion and keep free from trash weeds.

B. Repair and reestablish grades in settled, eroded and rutted areas to the specified grades and tolerances.

END OF SECTION

SECTION 02221 EXCAVATION AND SUBGRADE PREPARATION FOR SIDEWALKS, CURBS AND GUTTERS

PART 1 GENERAL

1.01 SUMMARY

A. This section includes excavation for curbs, gutters, sidewalks and minor quantities of new roadbeds.

1.02 REFERENCES

A. Specific tests as noted herein: ASTM - American Society for Testing of Materials

1.03 SUBMITTALS

A. The following shall be submitted in accordance with the section governing submittal format and requirements:
   1. SD-08 Statements: Earthwork: Procedure and location for disposal of unused satisfactory material. Proposed source of borrow material.

1.04 DEFINITIONS

A. Satisfactory Materials: Satisfactory materials shall comprise any materials classified by, ASTM D 2487 as GW, GP, SW, GM, GC, SP, SM SC, ML, or CL.

B. Unsatisfactory Materials: Unsatisfactory materials shall comprise any materials classified by ASTM D 2487 as Pt, OH, OL, CN or MN.

C. Cohesionless and Cohesive Materials: Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic. Testing required for classifying materials shall be in accordance with ASTM D 4318, ASTM C 136, ASTM D 422, and ASTM D 1140.

D. Degree of Compaction: Degree of compaction required is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557. This will be abbreviated below as a percent of laboratory maximum density.

1.05 CLASSIFICATION OF EXCAVATION

A. No consideration will be given to the nature of the materials, and all excavation will be designated as unclassified excavation

1.06 DISPOSAL OF EXCESS EXCAVATED MATERIALS

A. All excess fill material shall be disposed of off base at the contractor's expense.

PART 2 PRODUCTS (not used)

PART 3 EXECUTION

3.01 STRIPPING OF TOPSOIL

A. Where indicated or directed, topsoil shall be stripped to a depth indicated in the task order. Topsoil shall be spread on areas already graded and prepared for topsoil, or when so specified topsoil shall be transported and deposited in stockpiles convenient to areas that are to receive application of the topsoil later, or at locations indicated or specified. Topsoil shall be kept separate from other excavated

materials, brush, litter, objectionable weeds, roots, stones larger than 2 inches in diameter, and other materials that would interfere with planting and maintenance operations.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum as necessary for the work to be done. Removal and excavation of existing concrete or pavement less than 300 sq ft in affected area will not require technical survey of the area. Depths of excavation for these small orders can be measured by "eyeball" with a simple scale.

B. Notify Contracting Officer in writing 7 days prior to commencement of work to remove and/or relocate utilities that are observed to interfere with the proposed excavation.

3.03 EXCAVATION

A. Excavate subsoil required to accommodate curbs, gutters, paving, and sidewalks, as well as the required base aggregate course. Excavation depth shall be as necessary to accommodate the base aggregate and pavement specified in the task order. Where excavation depth is not specified; refer to subsection 3.05, "Depth of Excavation".

B. For excavations over 1000 sq ft in surface area, grade top perimeter of excavation to prevent surface water from draining into excavation. For excavations less than 1000 sq ft, small hand formed "mounds" or sandbags around the perimeter will suffice. For work that will be completed in the same day and for which there is little danger of surface water run-off, special grading or sandbags is not required.

C. Hand trim excavation. Remove loose matter, large rocks, roots or any other material that could interfere with the base aggregate layer.

D. Notify Contracting Officer immediately if subsurface conditions are notably different than typical for the area in terms of water content, rock layers, unknown utilities, trash, or buried debris including potential archeological artifacts. Discontinue affected Work in area until notified to resume work.

E. Correct unauthorized excavation at no extra cost to Government. Excavation deeper than authorized or specified shall be re-filled and thoroughly compacted in lifts no more than 3" deep. If excess surface water or organic material prevents compaction (as determined by the Contracting Officer), the contractor will provide aggregate fill as specified in Section 02231 for the base course and will complete infill by mechanical vibrator instead of by hand tamping.

F. Remove excavated material from site. Proper disposition of excavated material is the responsibility of the contractor.

G. Underpin adjacent structures, which may be damaged by excavation work, including utilities and pipe chases.

H. Provide de-watering as necessary to ensure excavations are dry prior to compaction or addition of aggregates.

1. Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. French drains, sumps, ditches or trenches will not be permitted within 3 feet of the foundation of any structure, except with specific written approval, and after specific contractual provisions for restoration of the foundation area have been made. Control measures shall be taken by the time the excavation reaches the water level in order to maintain the integrity of the in situ material. While the excavation is open, the water level shall be maintained continuously, at least 1 foot below the working level.
2. Operate dewatering system continuously until construction work below existing water levels is complete.

I. For excavations near utilities, use of buried warning and identification tape shall be provided as appropriate for each line exposed during excavations. Use polyethylene plastic and metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 -inch-minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil. For all non-metallic piping use a detection wire wrapped around the pipe, in addition to the warning tape. Detection wire shall be, as a minimum, insulated single strand, solid copper with a minimum of 12 AWG

Warning Tape Color Codes

Red	Electric
Yellow:	Gas, Oil; Dangerous Materials
Orange:	Telephone and Other Communications
Blue:	Water Systems
Green:	Sewer Systems
White:	Steam Systems
Gray:	Compressed Air

3.04 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 01400.

3.05 DEPTH OF EXCAVATION

A. Unless specifically directed otherwise, standard excavation depth will conform to the following:
   1. For repair/replacement of existing concrete sidewalks, curbs, gutters, and roadways: Use the remainder of the existing aggregate subgrade to serve as the basis for the new concrete. (No new excavation required). Where elevation changes require the disruption of the existing subgrade, excavate to an elevation depth at least equal to the pavement thickness plus 6" (when measured down, starting from the upper surface of the finish pavement). Remove all debris and remnants resulting from the demolition of the existing concrete.

   2. For new concrete sidewalks, curbs and gutters: Provide a minimum excavation depth equal to the pavement thickness plus 4 inches.

   3. For new roadways (Asphalt or Concrete): Provide excavation necessary to accommodate the pavement and base/subbase cross section specified. If design drawings are included, they shall take precedence over this specification and the task order unless specifically stated otherwise in writing from the Contracting Officer. Where no design drawings exist, contact the Contracting Officer to obtain standard subgrade requirements for the area and soil conditions under consideration.

   4. For asphalt sidewalks, curbs and gutters (repair/replacement or new work): Measure existing subgrade (where present). For subgrades less than 6" deep, excavate as necessary to allow for a final subgrade minimum depth of 6" after new material is combined and compacted with existing material. Subgrades greater than 6" depth may remain with no further excavation. Where no subgrade is present, excavate to depth of the pavement thickness plus 6 inches, when measured from the upper surface of the finished pavement.

3.06 SELECTION OF BORROW MATERIAL

A. Borrow material shall be selected to meet the requirements and conditions of the particular fill or embankment for which it is to be used. Unless specifically provided, no borrow shall be obtained within the limits of the project site without prior written approval. Necessary clearing, grubbing, and satisfactory

drainage of borrow pits and the disposal of debris thereon shall be considered related operations to the borrow excavation and shall be performed by the Contractor at no additional cost to the Government.

3.07 OPENING AND DRAINAGE OF EXCAVATION AND BORROW PITS

A. Except as otherwise permitted, borrow pits and other excavation areas shall be excavated in such manner as will afford adequate drainage. Overburden and other spoil material shall be transported to designated spoil areas or otherwise disposed of as directed. Borrow pits shall be neatly trimmed and drained after the excavation is completed. The Contractor shall ensure that excavations of any area, operation of borrow pits, or dumping of spoil material results in minimum detrimental effects on natural environmental conditions.

3.08 GRADING AREAS

A. When so provided and where indicated, work under contract will be divided into grading areas, within which satisfactory excavated material shall be placed in embankments, fills, and required backfills.

3.09 BACKFILL

A. Backfill adjacent to any and all types of structures shall be placed and compacted to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials, in such a manner as to prevent wedging action or eccentric loading upon or against any structure. Ground surface on which backfill is to be placed shall be prepared as specified in paragraph PREPARATION OF GROUND SURFACE FOR EMBANKMENTS. Compaction requirements for backfill materials shall also conform to the applicable portions of paragraphs PREPARATION OF GROUND SURFACE FOR EMBANKMENTS, EMBANKMENTS, and SUBGRADE PREPARATION, below and other applicable sections. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment well suited to the material being compacted.

3.10 PREPARATION OF GROUND SURFACE FOR EMBANKMENTS

A. Ground surface on which fill is to be placed shall be stripped of live, dead, or decayed vegetation, rubbish, debris, and other unsatisfactory material; plowed, disked, or otherwise broken up; pulverized; moistened or aerated as necessary; thoroughly mixed; and compacted to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment well suited to the material being compacted. The prepared ground surface shall be scarified and moistened or aerated as required just prior to placement of embankment materials to assure adequate bond between embankment material and the prepared ground surface.

3.11 EMBANKMENTS

A. Earth Embankments: Earth embankments shall be constructed from satisfactory materials free of organic or frozen material and rocks with any dimension greater than 3 inches. The material shall be placed in successive horizontal layers of loose material not more than 6 inches in depth. Each layer shall be spread uniformly on a soil surface that has been moistened or aerated as necessary and scarified or otherwise broken up in such a manner that the fill will bond with the surface on which it is placed. After spreading, each layer shall be plowed, disked, or otherwise broken up; moistened or aerated as necessary; thoroughly mixed; and compacted to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials. Compaction requirements for the upper portion of earth embankments forming subgrade for pavements shall be identical with those requirements specified in paragraph SUBGRADE PREPARATION. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment well suited to the type of material being compacted.

3.12 SUBGRADE PREPARATION

A. Construction Subgrade shall be shaped to line, grade, and cross section, and compacted as specified. This operation shall include plowing, disking, and any moistening or aerating required to obtain specified compaction. After rolling, the surface of the subgrade for roadways shall not show deviation greater than

5/8 inch when tested with a 10 foot straightedge applied both parallel and at right angles to the centerline of the area. The elevation of the finished subgrade shall not vary more than 0.05 foot from the established grade and cross section.

B. Compaction: Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment well suited to the type of material being compacted.

1. Subgrade for Pavements: Subgrade for pavements and shoulders shall be compacted to at least the percentage of laboratory maximum density in the following table for the specific depths below the surface of the pavement [or shoulders] shown.

Depth Below Pavement (or Shoulder) Surface - Inches		Percentage of Laboratory Maximum Density Required			
		Fill		Cut	
From	To	Cohesive materials	Cohesionless materials	Cohesive materials	Cohesionless materials
0"	**5"**	**100**	**100**	**100**	**100**
5"	**11"**	**95**	**100**	**95**	**100**
12"	**16"**	**90**	**95**	**90**	**95**
17"	**20"**	**85**	**95**	**85**	**95**

Any depths over 20" will be specified in individual delivery orders.

2. Subgrade for Shoulders: Subgrade for shoulders shall be compacted to at least 85 percent laboratory maximum density for the depth below the surface of shoulder shown in the table above.

3.13 SHOULDER CONSTRUCTION

A. Shoulders shall be constructed of satisfactory excavated or borrow materials or as otherwise shown or specified herein. Shoulders shall be constructed as soon as possible after adjacent paving is complete, but in the case of rigid pavements, shoulders shall not be constructed until permission of the Contracting Officer has been obtained. The entire shoulder area shall be compacted to at least the percentage of maximum density as specified in paragraph SUBGRADE PREPARATION above. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment well suited to the type of material being compacted. Shoulder construction shall be done in proper sequence in such a manner that adjacent ditches will be drained effectively and that no damage of any kind is done to the adjacent completed pavement. The completed shoulders shall be true to alignment and grade and shaped to drain in conformity with the cross section shown.

3.14 FINISHING

A. The surface of all excavations, embankments, and subgrades shall be finished to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown. The degree of finish for all graded areas shall be within 0.1 foot of the grades and elevations indicated except that the degree of finish for subgrades shall be specified in paragraph SUBGRADE PREPARATION above. Gutters and ditches shall be finished in a manner that will result in effective drainage. The surface of areas to be turfed shall be finished to smoothness suitable for the application of turfing materials.

3.15 TESTING

A. Testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government. Testing shall be performed by an approved commercial testing laboratory. Field in-place density shall be determined in accordance with ASTM D 1556 and/or ASTM D 2167, and/or ASTM D

2922. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted using only the sand cone method as described in ASTM D 1556. ASTM D 2922 results in a wet unit weight of soil and when using this method ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D 3017, the calibration checks of both the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and in intervals as directed by the Contracting Officer. ASTM D 2937, the Drive Cylinder Method shall be used only for soft, fine-grained, cohesive soils. When test results indicate, as determined by the Contracting Officer, that compaction is not as specified, the material shall be removed, replaced and recompacted to meet specification requirements, at no additional expense to the Government. Tests on recompacted areas shall be performed to determine conformance with specification requirements.

B. Fill and Backfill Material Gradation: One test per 2,500 cubic yards stockpiled or in-place source material. Gradation of fill and backfill material shall be determined in accordance with ASTM C 136, ASTM D 422, or ASTM D 1140 as appropriate.

C. In-Place Densities:

1. One test per 1,000 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by other than hand-operated machines.

2. One test per 1,000 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by hand-operated machines.

D. Moisture Contents In the stockpile, excavation or borrow areas, a minimum of two tests per day per type of material or source of material being placed during stable weather conditions. During unstable weather, tests shall be made as dictated by local conditions and approved by the Contracting Officer.

E. Optimum Moisture and Laboratory Maximum Density: Tests shall be made for each type material or source of material including borrow material to determine the optimum moisture and laboratory maximum density values. One representative test per 1,000 cubic yards of fill and backfill, or when any change in material occurs which may affect the optimum moisture content or laboratory maximum density.

F. Tolerance Tests for Subgrades: Continuous checks on the degree of finish specified in paragraph SUBGRADE PREPARATION shall be made during construction of the subgrades.

3.16 SUBGRADE AND EMBANKMENT PROTECTION

A. During construction, embankments and excavations shall be kept shaped and drained. Ditches and drains along subgrade shall be maintained in such a manner as to drain effectively at all times. The finished subgrade shall not be disturbed by traffic or other operation and shall be protected and maintained by the Contractor in a satisfactory condition until ballast, subbase, base, or pavement is placed. The storage or stockpiling of materials on the finished subgrade will not be permitted. No subbase, base course, ballast, or pavement shall be laid until the subgrade has been checked and approved, and in no case shall subbase, base, surfacing, pavement, or ballast be placed on a muddy, spongy, or frozen subgrade.

END OF SECTION

SECTION 02222 EXCAVATION AND TRENCHING FOR FOUNDATIONS, SLAB ON GRADE, AND UTILITY SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Protection of existing utilities.
B. Protection of existing buildings and structures.
C. Excavation for building foundations.
D. Excavation for slabs-on-grade and paving.
E. Excavation for utilities to 5 feet outside of building line.
F. Excavation, trenching, and backfilling requirements for installation, maintenance, repair, and replacement of storm sewer, sanitary sewer, and water distribution lines and appurtenances to the points of connection within 1.5 m (5 feet) of the buildings.

1.02 REFERENCES:

A. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 422 (1963; R 1990) Particle-Size Analysis of Soils

ASTM D 1556 (1990) Density and Unit Weight of Soil in Place by the Sand-Cone Method

ASTM D 698 (1991) Laboratory Compaction Characteristics of Soil Using Standard Method

ASTM D 2167 (1984; R 1990) Density and Unit Weight of Soil in Place by the Rubber Balloon Method

ASTM D 2487 (1992) Classification of Soils for Engineering Purposes (Unified Soil Classification System)

ASTM D 2922 (1991) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

ASTM D 3017 (1988) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

1.03 DEFINITIONS

A. Degree of Compaction shall be expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 698.

1.04 SUBMITTALS The following shall be submitted in accordance with Section 01300 - Submittals.

A. Field Density Test Reports.

B. Backfill Material Test Reports.

1.05 COMPLETION OF WORK Should the Contractor fail to complete the work as scheduled, the Contracting Officer may limit the work which has been started but not completed to any such amount as deemed reasonable. No extension of time will be granted to the Contractor for not being permitted to start on new streets, alleys or rights-of-way to construction for this reason.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Satisfactory Materials shall consist of any material classified by ASTM D 2487 as GW, GP, and SW.

B. Unsatisfactory Materials: Unsatisfactory materials shall be materials that do not comply with the requirements for satisfactory materials. Unsatisfactory materials include, but are not limited to those

materials containing roots and other organic matter, trash, debris, frozen materials and stones larger than 75 mm (3 inches), and materials classified in ASTM D 2487, as PT, OH, and OL. Unsatisfactory materials also include man-made fills, refuse, or backfills from previous construction.

C. Cohesionless and Cohesive Materials:
   1. Cohesionless materials shall include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic.

   2. Cohesive materials include materials classified in ASTM D 2487 as GC, SC, CL, MH, and CH.

D. Unyielding Material: Unyielding material shall consist of rock and gravelly soils with stones greater than 75 mm (3 inches) in any dimension or as defined by the pipe manufacturer, whichever is smaller.

E. Unstable Material shall consist of materials too wet to properly support the utility pipe, conduit, or appurtenant structure.

F. Select Granular Material: Select granular material shall consist of well-graded sand, gravel, crushed gravel, crushed stone or crushed slag composed of hard, tough and durable particles, and shall contain not more than 10 percent by weight of material passing a 0.075 mm (No. 200) mesh sieve and no less than 95 percent by weight passing the 25 mm (1-inch) sieve. The maximum allowable aggregate size shall be 100 mm (1 inch per foot) of pipe diameter, or the maximum size recommended by the pipe manufacturer, whichever is smaller.

G. Initial Backfill Material shall consist of select granular material or satisfactory materials free from rocks 2 mm (3/4 inch) or larger in any dimension or free from rocks of such size as recommended by the pipe manufacturer, whichever is smaller.

H. Plastic Marking Tape: Plastic marking tape shall be acid and alkali-resistant polyethylene film, 152 mm (6 inches) wide with minimum thickness of 0.102 mm (0.004 inch). Tape shall have a minimum strength of 12.1 MPa (1750 psi) lengthwise and 10.3 MPa (1500 psi) crosswise. The tape shall be manufactured with integral wires, foil backing or other means to enable detection by metal detector when the tape is buried up to 3 feet deep. The tape shall be of a type specifically manufactured for marking and locating underground utilities. The metallic core of the tape shall be encased in a protective jacket or provided with other means to protect it from corrosion. Tape color shall be as specified in Table 1 and shall bear a continuous printed inscription describing the specific utility.

Table 1. Tape Color

Red:	Electric
Yellow:	Gas, Oil, Dangerous Materials
Orange:	Telephone, Telegraph, Television, Police, and Fire Communications
Blue:	Water Systems
Green:	Sewer Systems

PART 3 - EXECUTION

3.01 PREPERATION

A. Verify the existence and location of underground utilities along the route of work. Omission from, or inclusion of, utility locations on the Drawings is not to be considered as the nonexistence of, or a definite location of, existing underground utilities.
   1. Identify required lines, levels, contours, and datum.
   2. Identify known underground, above ground and aerial utilities. Stake and flag locations.
   3. Protect above and below grade utilities which are to remain.
   4. Protect plants, shrubs, trees, lawns, and other features remaining as a portion of final landscaping.

5. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.

3.02 PROTECTION

A. Existing Utilities:
   1. Protect existing known utilities from damage due to work required under the scope of this contract. Any damage to utilities will be repaired at the expense of the Contractor.
   2. Before beginning trenching operations, obtain an Air Force Form 103, Civil Engineering Work Clearance Permit for any underground or overhead utilities which may be on, or in close proximity to, the trenching areas.

B. Existing Buildings and Structures:
   1. Guard against, and be responsible for, any movement, settlement, or collapse of adjacent buildings, sidewalks, structures, and underground and aboveground utilities. Repair damage done to the Base's property or any other property, on or off the premises, by reason of required work. Adequately brace walls during backfilling and compacting operations.
   2. Items to be Relocated: Exercise the greatest possible care when items are scheduled for relocation. Use only skilled labor in the appropriate crafts. Identify items to be relocated, store and protect as directed.

C. Provide for surface drainage during the period of construction in a manner that protects trenches and adjacent areas. Take precautions and temporary measures, such as temporary seeding, to prevent damage from erosion of freshly graded areas. This applies to damage of newly graded areas within construction limits and damage to adjacent properties by eroded materials.

3.03 EXCAVATION

A. General:
   1. Excavation shall be performed to the lines and grades indicated.
   2. During excavation, material satisfactory for backfilling shall be stockpiled in an orderly manner at a distance from the banks of the trench equal to 1/2 the depth of the excavation, but in no instance closer than (2 feet).
   3. Excavated material not required or not satisfactory for backfill shall be removed from the site.
   4. Grading shall be done as may be necessary to prevent surface water from flowing into the excavation, and any water accumulating therein, regardless of source, shall be removed to maintain the stability of the bottom and sides of the excavation. Continue to remove and dispose of water until utility lines, fittings, manholes, and other appurtenances are in place and sealed against the entrance of water. Water, earth, or any foreign materials shall not be allowed to enter the utility lines.
   5. Unauthorized overexcavation shall be backfilled in accordance with section 02223, paragraphs 3.05 & 3.07 at no additional cost to the Government.
   6. Correct unauthorized excavation at no extra cost to Government.
   7. Remove unused excavated material from site in accordance with the following:
      a. The contractor shall notify the Contracting Officer of the estimated or actual quantity of excess satisfactory soil, defined as those complying with ASTM D2487soil classification groups GW, GP, GM, SM, SW, and SP. The excess soil shall be removed and disposed of off base by the Contractor.

      b. All unsatisfactory soil, as defined as those complying with ASTM D2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT, shall be the Contractor's responsibility for disposal off base.

B. Trench Excavation: The trench shall be excavated as recommended by the manufacturer of the pipe to be installed. Trench walls below the top of the pipe shall be sloped, or made vertical, and of such width as recommended in the manufacturer's installation manual. Where no manufacturer's installation manual is available, trench walls shall be made vertical. Trench walls more than five feet high shall be shored, cut back to a stable slope, or provided with equivalent means of protection for employees who may be exposed to moving ground or cave in. Trench walls which are cut back shall be excavated to at least the angle of

repose of the soil. Special attention shall be given to slopes which may be adversely affected by weather or moisture content. The trench width below the top of pipe shall not exceed 24 inches plus pipe outside diameter (O.D.) for pipes of less than 24 inches inside diameter and shall not exceed 36 inches plus pipe outside diameter for sizes larger than 24 inches inside diameter. Where recommended trench widths are exceeded, redesign, stronger pipe, or special installation procedures shall be utilized by the Contractor. The cost of redesign, stronger pipe, or special installation procedures shall be borne by the Contractor without any additional cost to the Government.

1. Bottom Preparation: The bottoms of trenches shall be accurately graded to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Bell holes shall be excavated to the necessary size at each joint or coupling to eliminate point bearing. Stones of 1.5 inches or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, shall be removed to avoid point bearing.
2. Removal of Unyielding Material: Where unyielding material is encountered in the bottom of the trench, such material shall be removed a minimum of 4 inches below the required grade and replaced with suitable materials as provided in section 02223 ,paragraphs 3.05 & 3.07.
3. Removal of Unstable Material: Where unstable material in encountered in the bottom of the trench, such material shall be removed to the depth directed and replaced to the proper grade with Type "D" as provided in Section 02333, paragraph 2.01.D. When removal of unstable material is required due to the fault or neglect of the contractor in his performance of the work, the resulting material shall be excavated and replaced by the Contractor without additional cost to the Government.
4. Jacking, Boring, and Tunneling: Unless otherwise indicated, excavation shall be by open cut except that sections of a trench may be jacked, bored, or tunneled if, in the opinion of the Contracting Officer, the pipe, or duct can be safely and properly installed and backfill can be properly compacted in such sections.

C. Excavation for Appurtenances: Excavation for manholes, catch-basins, inlets, or similar structures shall be sufficient to leave at least 12 inches clear between the outer structure surfaces and the face of the excavation or support members. Removal of unstable material shall be as specified above. When concrete or masonry is to be placed in an excavated area special care shall be taken not to disturb the bottom of the excavation. Excavation to the final grade level shall not be made until just before the concrete or masonry is to be placed.

3.04 BACKFILLING AND COMPACTION: SEE SECTION 02223

3.05 SPECIAL REQUIREMENTS: Special requirements for both excavation and backfill relating to the specific utilities are as follows:

A. Water Lines: Trenches shall be of a depth to provide a minimum cover of 3-1/2 feet from the existing ground surface, or from the indicated finished grade, whichever is lower, to the top of the pipe.

B. Plastic Marking Tape: Warning tapes shall be installed directly above the pipe, at the depth of 12-18 inches below finished grade unless otherwise shown.

3.06 TESTING: Testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government.

A. Testing Facilities: Tests shall be performed by an approved commercial testing laboratory or may be tested by facilities furnished by the Contractor. No work requiring testing will be permitted until the facilities have been inspected and approved by the Contracting Officer. The first inspection shall be at the expense of the Government. Cost incurred for any subsequent inspection required because of failure of the first inspection will be charged to the Contractor.

B. Testing of Backfill Materials: Characteristics of backfill materials shall be determined in accordance with particle size analysis of soils ASTM D 422 and moisture-density relations of soils ASTM D 1557. A minimum of one particle size analysis and one moisture-density relation test shall be performed on each different type of material used for bedding and backfill.

C. Field Density Tests: Tests shall be performed in sufficient numbers to ensure that the specified density is being obtained. A minimum of one field density test per lift of backfill for every 500 feet of installation shall be performed. One moisture density relationship shall be determined for every 1500 cubic yards of material used. Field in-place density shall be determined in accordance with ASTM D 1556 or ASTM D 2922. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted using the sand cone method as described in paragraph Calibration of the ASTM publication. ASTM D 2922 results in a wet unit weight of soil and when using this method, ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall be checked along with the density calibration checks as described in ASTM D 3017. The calibration checks of both the density and moisture gauges shall be made at the beginning of a job, on each different type of material encountered, at intervals as directed by the Contracting Officer. Copies of calibration curves, results of calibration tests, and field and laboratory density tests shall be furnished to the Contracting Officer. Trenches improperly compacted shall be reopened to the depth directed, then refilled and compacted to the density specified at no additional cost to the Government.

D. Displacement of Sewers: After other required tests have been performed and the trench backfill compacted to 2 feet above the top of the pipe, the pipe shall be inspected to determine whether significant displacement has occurred. This inspection shall be conducted in the presence of the Contracting Officer's representative. Pipe sizes larger than (36 inches) shall be entered and examined, while smaller diameter pipe shall be inspected by shining a light or laser between manholes or manhole locations, or by the use of television cameras passed through the pipe. If, in the judgment of the Contracting Officer, the interior of the pipe shows poor alignment or any other defects that would cause improper functioning of the system, the defects shall be remedied as directed at no additional cost to the Government.

3.07 SETTLEMENT OCCURRING WITHIN THE GUARANTEE PERIOD: Regardless of the type of compaction or settlement methods used, should settlement occur, refill, compact, and smooth off trenches until made to conform to the ground surface. Correct settlement under pavements and sidewalks as required.

3.08 GRADING: Grade to a finish ordinarily obtained from a blade grader, without abrupt changes in grade or holes that will hold water so that effective drainage is secured at all times. Maintain roadways in an acceptable condition at all times until final acceptance.

3.09 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 01410.

B. Provide for visual inspection of bearing surfaces.

3.10 SPECIAL PROVISIONS

A. Maximum length of open trench at any time shall not exceed 165 linear meters (500 linear feet) unless approved otherwise. When approved, the Contractor may upon request, conduct pipe laying activities at more than one separate location; with the restrictions on open trenches applying to each location.

B. Move minor structures and restore temporary openings in fences to their original condition. Stockpile and reset, in original locations, any culverts, pipes, cables, or minor structures which are moved. Determine actual condition as to structures and miscellaneous obstacles to move for construction purposes. Removal and placement of these items shall be considered as part of the Contractor's obligation, and no additional payment shall be made.

C. Make open cuts or excavations in sidewalks without additional compensation. Remove concrete from joint to joint wherever the trench crosses a sidewalk or sawcut for asphalt driveways, walkways, and jogging paths. After the pipe is in place and backfilled to the specified density the Contractor shall, at his own expense, replace or reconstruct sidewalks, walkways, and driveways with like materials and restore to the original condition in a manner satisfactory to the Contracting Officer. All installations under pavements and slabs will be accomplished by directional boring to a minimum of five feet beyond the pavement or slab

edge. Asphalt settlement or concrete breakage over trenches shall be repaired as directed by the Contracting Officer.

D. The Contractor shall maintain all the streets he/she is working on until acceptance of the work. Maintenance shall include grading the streets if they become bumpy or rough and the spraying of water on the streets to keep the dust down.

E. Re-sod areas disturbed by grading or construction.

F. Cleanup shall proceed directly behind backfilling to accommodate the return to normal conditions. The amount of work on which complete cleanup has not been accomplished shall be limited to 330 linear meters (1,000 linear feet) for the entire job should the Contractor fail to diligently pursue job cleanup.

END OF SECTION

SECTION 02223: BACKFILLING & COMPACTION

PART 1 GENERAL

1.01 RELATED SPECIFICATION SECTIONS:
A. Section 01000 – GENERAL REQUIREMENTS

1.02 SECTION INCLUDES:
A. Building perimeter backfilling.

B. Site filling and backfilling.

C. Fill under slabs-on-grade and paving.

D. Consolidation and compaction.

E. Fill for over-excavation.

F. Sheet vapor retardant and fill.

1.03 REFERENCES:
A. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

B. ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 kg) Rammer and 12 inch (304.8 mm) Drop.

C. ANSI/ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.

D. ANSI/ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

E. State of Florida Department of Transportation (DOT), Standard Specifications for Road and Bridge Construction (SSRBC), 1999 or later edition.

1.04 SUBMITTALS:
A. Submit under provisions of Section 01300.

B. Samples: Submit 10 lb. sample of each type of fill to testing laboratory, in airtight containers.

PART 2 PRODUCTS

2.01 FILL MATERIALS:
A. Type A - Crushed Stone: Pit run or river washed natural stone; free of shale, clay, friable material, sand, debris; graded in accordance with ANSI/ASTM C136 within the following limits:

Sieve Size	Percent Passing
2 inches (5O mm)	100
One inch (25 mm)	95
3/4 inch (19 mm)	95 to 100
5/8 inch (16 mm)	75 to 100
3/8 inch (09 mm)	55 to 85
No. 4	35 to 60

B. Type B - Pea Gravel: Natural stone; washed, free of clay, shale, organic matter; graded in accordance with ANSI/ASTM C136, to the following:
   1. Minimum Size: 1/4 inch.
   2. Maximum Size: 5/8 inch.

C. Type C - Sand: Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, or organic matter; graded in accordance with ANSI/ASTM C136, within the following limits:

Sieve Size	Percent Passing

No. 4	100
No. 14	10 to 100
No. 50	5 to 90
No. 100	4 to 30
No. 200	0

D. Type D - Structural Fill:
1. Earth for structural fill shall consist of material containing no more than 10 percent by weight finer than No. 200 US Standard Sieve and shall be inorganic and conform to the following properties:
   a. Liquid Limit = 30 maximum
   b. Plasticity Index = 20 maximum
   c. Dry Unit Weight = 100 pcf minimum
2. Gravel shall consist of crushed stone or gravel. Size and gradation shall be as specified hereinbelow: Total Percent Passing Sieve (By Weight)

Square **Sieve**	**1-1/2**	**1**	**3/4**	**1/2**	**3/8**	**#4**	**#8**
Top	100	100	100	90-	40-	0-	0-
One-Third (Size #7)	100	70	10	5			
Bottom Two-Thirds	100 100	95- 100	90- 60	25- 55	20- 10	0- 5	0-

3. Material, which does not conform to the above classifications, may be used as Site Fill material, only outside building and pavement lines, provided Site Fill specifications are met.

E. Subsoil: Reused or imported, free of gravel larger than 3-inch size, debris, and organic material.

F. Concrete: Lean concrete with a compressive strength of 1,000 psi.

PART 3 EXECUTION

3.01 EXAMINATION:
A. Verify fill materials to be reused are acceptable.

B. Verify foundation perimeter drainage installation has been inspected.

3.02 PREPARATION:
A. Generally, compact subgrade to density requirements for subsequent backfill materials.

B. Cut out soft areas of subgrade not capable of insitu compaction. Backfill with Type A, B, C, or D fill and compact to density equal to or greater than requirements for subsequent backfill material.

C. Prior to placement of aggregate base course material at gravel or paved areas, compact subsoil to 98percent of its maximum dry density in accordance with ANSI/ASTM D698.

3.03 BACKFILLING:
A. Backfill areas to contours and elevations with unfrozen materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

C. Granular Fill: Place and compact materials in continuous layers not exceeding 8 inches compacted depth.

D. Soil Fill: Place and compact material in continuous layers not exceeding 8 inches compacted depth.

E. Employ a placement method that does not disturb or damage utilities in trenches.

F. Maintain optimum moisture content of backfill materials to attain required compaction density.

G. Slope grade away from building A minimum of 6-inches in 10 feet unless noted otherwise.

H. Make grade changes gradual. Blend slope into level areas.

I. Remove surplus backfill materials from site.

J. Trench Backfill: Trenches shall be backfilled to the grade shown. The trench may be backfilled to 2 feet above the top of pipe prior to performing the required pressure tests. The joints and couplings shall be left uncovered during the pressure test. The trench shall not be completely backfilled until all specified tests are performed.

3.04 TOLERANCES:

A. Top surface of backfilling must be plus or minus one inch from required elevations.

3.05 FIELD QUALITY CONTROL:

A. Field inspection and testing will be performed under provisions of Section 01410.

B. Tests and analysis of fill material will be performed in accordance with ANSI/ASTM D698 and with Section 01410.

C. Compaction testing will be performed in accordance with ANSI/ASTM DI556, ANSI/ASTM D2922, and ANSI/ASTM D698 and with Section 01410.

D. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to Government.

E. Moisture & Density tests shall be in accordance with applicable sections of the Florida Dept. of Transportation Standard Specifications for the specific type of paving.

3.06 PROTECTION OF FINISHED WORK:

A. Re-compact fills subjected to vehicular traffic.

3.07 COMPACTION SCHEDULE:

A. Slab-On-Grade, Footings and Bottom of Trenches:
   1. Type D fill, 8 inches thick below bottom of floor slab/footing/trench, compacted to 100 percent.
   2. Cover with Type A fill, if called for on the drawings, 4 inches thick, compacted to 100 percent.
   3. Frequency of Tests:
      a. Slab-On-Grade: One per 1000 square feet of slab area or fraction thereof for each lift.
      b. Footings and Bottom of Trenches: One per 50 linear feet or fraction thereof.

B. Exterior Side of Foundation Walls and Under Grass Areas:
   1. Subsoil or Type D fill, to 6" below finish grade, compacted to 95 percent.
   2. Remainder of 6" fill with topsoil, Compacted to 90 percent.
   3. Frequency of Tests:
      a. Exterior Areas: One per 1000 square feet or fraction thereof.

C. Fill Under Asphalt Paving (Base):
   1. Type A fill, minimum 6" inches thick below bottom of finish paving, compacted to 100 percent; or
   2. Minimum 6 inches thick lean concrete to minimum compressive strength of 1,000 psi.
   3. Frequency of Tests:
      a. Base Course: One per 1000 square feet or fraction thereof.

END OF SECTION

SECTION 02231 AGGREGATE BASE COURSE

PART 1 GENERAL

1.01 SUMMARY

A. This section includes specifications for the aggregate base course and sub base course.

1.02 REFERENCES

A. Specific tests as provided herein:
   1. ASTM: American Society for Testing of Materials

1.03 SUBMITTALS

A. Submit the following information as listed for all base aggregate covering an area more than 200 sq ft of base material per site. New submittals for materials previously submitted and approved for work under this contract may not be required. No submittals are required for base aggregate used in single sites of less than 200 sq ft.
   1. Design Data
      a. Gradation curve
   2. Statements
      a. Source location and name
   3. Test Reports
      a. Bearing ratio – **CBR for airfields; LBR for roads and parking lots**
      b. Liquid limit
      c. Plasticity index
      d. Dry weight of slag
      e. Percentage of wear
      f. Moisture – Density Relations
   4. Field Test Reports
      a. Gradation tests
      b. Density tests

PART 2 PRODUCTS

2.01 MATERIALS

A. Graded Aggregate Base: Material shall be graded aggregate. Other materials may not be used without the approval of the Contracting Officer. Obtain materials from approved sources. Preliminary approval of pits/sources shall not mean all material found in the deposit will be acceptable. Maximum dimensions of material particles shall not be greater than two-thirds the compacted thickness of the layer in which it is to be placed. Percentage of loss shall not exceed 40 per ASTM C-131. Gradation of the final composite mixture shall conform to the following size and shall be the basis of the gradation curve:

GRADATION OF AGGREGATES
PERCENTAGE BY WEIGHT PASSING SQUARE-MESH SIEVE

	1-1/2"	1"	¾"
2-inch	100		
1-1/2-inch	70-100	100	
1-inch	45-80	60-100	100
1/2-inch	30-60	30-65	40-70
No. 4	20-50	20-50	20-50
No. 10	15-40	15-40	15-40
No. 40	5-25	5-25	5-25
No. 200	0-10	0-8	0-8

The above values are based on aggregates of uniform specific gravity. Percentages passing the various sieves may require appropriate correction when aggregates of varying specific gravities are used.

B. Liquid limit and plasticity index: Liquid limit and plasticity index requirements as stated shall apply to the aggregate component blended to meet the required gradation and to the aggregate in the completed subbase or base course. The portion of the aggregate passing a No. 40 sieve shall either be nonplastic or have a liquid limit not greater than 25 and a plasticity index not greater than 5, in accordance with ASTM D 4318.

2.02 SOURCE QUALITY CONTROL

A. Prior to production and delivery of aggregates, take at least one initial sample in accordance with ASTM D 75. Collect each sample by taking three incremental samples at random from source material to make a composite sample of not less than 50 pounds. Repeat sampling procedure when source of material is changed or when deficiencies or variations from specified grading of materials are found in testing.

1. Testing of Samples:
   a. Make gradation tests from each sample in accordance with ASTM C 136. Determine material passing the No. 200 sieve in accordance with ASTM C 117.
   b. Make Laboratory Density Tests using ASTM D 1557, Method B, C, or D, for all material.
   c. Minimum CBR value of 100 for airfields. Minimum LBR of 100 for roads/parking lots.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify subgrade has been inspected to determine if gradients and elevations are correct and dry.

3.02 AGGREGATE PLACEMENT

A. Spread aggregate base over prepared base to the total compacted thickness indicated on the plans.

B. Place aggregate loose in equal layers and compact when total thickness exceeds 6 inches.

C. Level and contour surfaces to elevations and gradients indicated.

D. Compact each layer to at least 100 percent of the maximum laboratory density determined in accordance with ASTM D 1557. Compact material inaccessible to rolling equipment by mechanical tamping. Finish surface of the layer by blading and rolling. Blade, roll, and tamp until surface is smooth and free from waves and irregularities. Aerate material excessively moistened by rain during construction. Aerate using blade graders, harrows, or other equipment until the moisture content is that needed to obtain specified density. Place and compact earth at edges of course for at least one foot of the shoulder.

E. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

F. Use mechanical vibrating tamping in areas inaccessible to compaction equipment.

3.03 TOLERANCES

A. Flatness: Perform smoothness test for areas in excess of 100 sq ft with a 10-foot straight edge applied parallel with and at right angles to centerline of the rolled area. Correct surface deviations in excess of 3/8 inch by loosening, adding or removing material, reshaping, watering, and compacting. When course is constructed in more than one layer, smoothness requirements apply only to the top layer.

B. Variation from True Elevation: Within 1/2 inch. For sidewalks, new work must have elevation within 1/4 inch of adjoining existing pavement.

3.04 FIELD QUALITY CONTROL

A. Perform the following tests on new work in place

1. Field Density Tests: ASTM D 1556 or ASTM D 2922, and ASTM D 3017. Take one field density test for each site that is greater than 200 sq ft. For jobs over 500 sq yds, take one field density test and one thickness test per 500 sq yds or fraction thereof.
2. Thickness Test Determine thickness of course from test holes not less than 3 inches in diameter. Obtain a thickness test for each site that is greater than 200 sq ft of course. For jobs over 500 sq yds, take one thickness test per 500 sq yds or fraction thereof. Where course deficiency is more than 1/2 inch, correct by scarifying, adding mixture of proper gradation, reblading, and recompacting. Where the measured thickness exceeds the indicated thickness by more than 1/2 inch, consider the measured thickness as the indicated or specified thickness plus 1/2 inch for determining the average. The average thickness shall be the average of the depth measurements and shall not underrun the thickness shown by more than 1/4 inch.

B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Government.

END OF SECTION

SECTION 02510 ASPHALTIC CONCRETE PAVING FOR ROADS AND PARKING LOTS

PART 1 GENERAL

1.01 RELATED SPECIFICATION SECTIONS:

A. Section 0000 - GENERAL REQUIREMENTS

1.02 SUMMARY

A. This section includes Asphaltic concrete paving, tack coat, and preservative seal for roads, parking lots, sidewalks, etc., but **excludes airfields.**

1.03 REFERENCES

A. Specific tests as provided herein:

1. AASHTO: American Association of State Highway Transportation Officials
2. ASTM: American Society for Testing of Materials
3. FDOT: Standard Specifications for Road and Bridge Construction (SSRBC)

Note: References to "the Engineer" shall be read as " the Contracting Officer". SSRBC subsections referring to "Basis of Payment" do not apply.

1.04 SUBMITTALS

A. Submit asphalt job mix formula for review by the Contracting Officer prior to placement of asphaltic concrete under this contract. State of Florida Department of Transportation mix S-1 is considered an acceptable mix for roads. **Airfields are not included.** State of Florida Department of Transportation mix S-3 is considered an acceptable mix for parking lots.

1.05 QUALITY ASSURANCE

A. Bituminous-concrete mixtures shall be sampled and tested for quality control during construction of the bituminous-concrete courses as follows:

MATERIAL	REQUIREMENT	TEST METHOD	NUMBER OF TESTS
Uncompacted bituminous concrete mix	Sampling	ASTM D 979	One for each mixture or day of operation
Asphalt	Cement content	ASTM D 2172	
	Mechanical analysis extracted aggregates	AASHTO T 30	
	Recovery of asphalt cement by Abson Method	ASTM D 1856	
	Penetration of recovered asphalt cement	ASTM D 5	
	Ductility of recovered asphalt cement	ASTM D 113	
Compacted bituminous-concrete	Bulk density	AASHTO T 166	Same as specified for uncompacted mix
Marshall samples	Marshall Stability and Flow Tests	ASTM D 1559	
In-place pavement	Density and thickness	As specified	Three specimens for each 1000 square yards (or fraction thereof) of completed bituminous concrete course

1.06 REGULATORY REQUIREMENTS

A. Conform to local (if any) and state requirements for paving work.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Bituminous prime and tack coats shall be applied only when the ambient temperature in the shade is above 50 °F or when the temperature has not been below 35 °F for 12 hours immediately prior to application. Application may commence when the aggregate base course is dry or contains moisture not in excess of the amount that will permit uniform distribution and the required penetration.

B. Bituminous-concrete courses shall be constructed only when the ambient temperature is above 40 ° F and the underlying base course is dry.

1.08 SPREADING EQUIPMENT

A. Self-propelled electronically controlled type, unless other equipment is authorized by the Contracting Officer. Equip spreading equipment of the self-propelled electronically controlled type with hoppers, tamping or vibrating devices, distributing screws, electronically adjustable screeds, and equalizing devices. Capable of spreading hot bituminous mixtures without tearing, shoving, or gouging and to produce a finished surface of specified grade and smoothness. Operate spreaders, when laying mixture, at variable speeds between 5 and 45 feet per minute. Design spreader with a quick and efficient steering device; a forward and reverse traveling speed; and automatic devices to adjust to grade and confine the edges of the mixture to true lines. The use of a spreader that leaves indented areas or other objectionable irregularities in the fresh laid mix during operations is prohibited.

PART 2 PRODUCTS

2.01 MATERIALS FOR BITUMINOUS CONCRETE

A. Aggregate for Bituminous-Concrete: Coarse aggregate shall conform to ASTM D 692. Fine aggregate shall conform to ASTM D 1073. The sand equivalent value shall be not less than 30.

B. Mineral Filler: Finely ground particles of limestone, hydrated lime or other mineral dust, free of foreign matter.

C. Asphalt Cement: The asphalt cement shall meet the requirements of ASTM D 3381, table 2, viscosity grade AC-20.

D. Bituminous Prime Coat: The bituminous prime coat shall be EPR-1 conforming to FDOT Specification Section 916-4.1.

E. Bituminous Tack Coat: The bituminous tack coat shall be rapid-curing cut-back asphalt conforming to ASTM D 2028, designation RC-70.

F. Job Mix Formulas: A job-mix formula for each bituminous-concrete mixture proposed for use in the work shall be submitted for approval prior to start of work.

2.02 PERFORMANCE REQUIREMENTS

A. Bituminous-concrete mixtures shall meet the performance requirements described when sampled, and tested. Calculations shall be made for density and voids analyses.

PERFORMANCE REQUIREMENTS

TEST PROPERTY	S-1/S-3
Number of compaction blows, each end of specimen	45 to 55
Marshall stability, pounds	1500 minimum
Marshall flow, 1/100-inch units	8 minimum 14 maximum
Percent air void	3 minimum 5 maximum

Percent of voids in mineral aggregate (min)	14

2.03 SOURCE QUALITY CONTROL

A. Provide mix design for asphalt under provisions of Section 01400.

B. Submit proposed mix design of each class of mix for review prior to commencement of work.

2.04 AGGREGATE GRADATION

A. The submitted job mix shall be within the design range of the following table for base and surface courses:

Percentage By Weight Passing Square Mesh Sieves: Type S-1

1"	3/4	1/2	3/8	no. 4	no.10	no.16	no.40	no.80	no.100	no.200
100	95-100	88-100	75-93	47-75	31-53		19-35	7-21	2-6	

Percentage By Weight Passing Square Mesh Sieves: Type S-3

1/2"	3/8"	no. 4	no. 10	no.16	no. 40	no. 80	no.100	no. 200
100	88-100	60-90	40-70		19-35	9-18		2-6

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify base conditions.

B. Verify that compacted aggregate base course is dry and ready to support paving and imposed loads.

C. Verify gradients and elevations of base are correct.

3.02 SUBBASE

A. Section 02231 - Aggregate Base Course: Refer to section 02231 for the basis of work under this subsection.

3.03 PREPARATION - TACK COAT

A. Surface Preparation: Immediately before application of a bituminous prime coat to the aggregate base-course surface or other contact surface, loose material or other objectionable substances shall be removed.

B. Priming the Base Course Surface: The prime coat shall be uniformly applied to the prepared base course surface. The rate of application shall be within the range of 0.15 and 0.40 gallon per square yard of surface. The temperature of the bituminous material at the time of application shall be within the range of 105 and 180 degrees F. Excess prime-coat material shall be squeegeed from the surface. Areas missed by the bituminous prime coat distributor shall be treated with prime coat material by means of hand sprayers. Following the application of prime coat material, the surface shall be allowed to dry without being disturbed for a period of not less than 48 hours or longer as may be necessary. Blotting the prime coat with fine aggregate will not be permitted.

C. Priming Other Contact Surfaces: Contact surfaces of curbs, gutters, manholes, and other structures projecting into or abutting the pavement shall be coated with a thin, uniform coating of bituminous tack-coat material prior to the bituminous-concrete mixture being placed against such structures. Following the application of the tack coat, the surface shall be allowed to dry until it is in a condition of tackiness to receive the bituminous-concrete mixture. Excess tack-coat material shall be squeegeed from the surface.

3.04 PLACING ASPHALT PAVEMENT - SINGLE COURSE

A. The bituminous-concrete mixture shall be placed on the prepared surface, uniformly spread and struck off. Bituminous-concrete courses shall be placed in layers of approximately equal thickness except that no layer shall be more than 2-inches thick after compaction.

B. Pavement Placing: Placing shall begin along the centerline of areas to be paved on a crowned section, at the high side of a section with a one-way slope and in the direction of the traffic flow. The mixture for each course shall be placed in strips not less than 10-feet wide. Progressive strip placement shall commence after rolling of the first strip. Rolling shall be extended to overlap the preceding strips. Placing the bituminous-concrete mixture shall be continuous.

C. Hand Placing: In areas where the use of machine spreading is not practicable, the mixture shall be spread and finished by the use of heated hand tools. The mixture shall be dumped on approved dump boards and distributed into place from the dump boards in a uniformly loose layer of a thickness that will, when compacted, conform to required grade and thickness. The mixture shall be dumped no faster than it can be handled properly by the shovelers and rakers.

D. Joints: Joints shall have the same texture, density, and smoothness as other sections of the course. Joints between old and new pavements, or between successive days' work, shall be made to ensure a continuous bond between the old and new sections of the pavement. Transverse joints in succeeding courses shall be offset at least 24 inches. The edge of the previously placed course shall be cut back to expose an even vertical surface over the full thickness of the course. Longitudinal joints in succeeding courses shall be offset at least 6 inches. When the edges of longitudinal joints are irregular or do not conform to the specifications, the edge shall be cut back to expose an even vertical surface over the full thickness of the course.

E. Machine Spreading: The range of temperatures of the mixtures at the time of spreading shall be between 275 degrees F and 300 degrees F. Bituminous concrete having temperatures less than minimum spreading temperature when dumped into the spreader will be rejected. Adjust spreader and regulate speed so that the surface of the course is smooth and continuous without tears and pulling, and of such depth that, when compacted, the surface conforms with the cross section, grade, and contour indicated. Unless otherwise directed, begin the placing along the centerline of areas to be paved on a crowned section or on the high side of areas with a one-way slope. Place mixture in consecutive adjacent strips having a minimum width of 10 feet, except where the edge lanes require strips less than 10 feet to complete the area. Construct longitudinal joints and edges to true line markings. Establish lines parallel to the centerline of the area to be paved, and place string lines coinciding with the established lines for the spreading machine to follow. Provide the number and location of the lines needed to accomplish proper grade control. When specified grade and smoothness requirements can be met for initial lane construction by use of an approved long ski-type device and for subsequent lane construction by use of a short ski or shoe, in-place string lines for grade control may be omitted. Place mixture as nearly continuous as possible and adjust the speed of placing as needed to permit proper rolling. Follow the following table for minimum spreading temperatures:

F. Minimum Spreading Temperatures: Minimum temperature of the asphaltic concrete mixture at the point of placement shall be 275 degrees F. Temperature to be taken within five (5) feet of spreader. Placement of mixtures less than specified will not be allowed and any pavement not meeting this requirement will be rejected.

3.05 COMPACTION

A. General: Compaction shall commence as soon after placing as the bituminous-concrete mixture will bear the weight of the roller without undue displacement. During rolling, the wheels shall be kept moist with the minimum amount of water required to avoid picking up the bituminous-concrete mixture. In places not accessible to the rollers, the mixture shall be compacted with hot hand tampers.

B. Rolling Procedure: Rolling shall commence longitudinally at the extreme sides of lanes and proceed toward the center of the pavement, except on superelevated curves. Rolling on superelevated curves shall commence on the low side and progress to the high side, overlapping on successive trips by at least one-half the width of the rear wheel of the roller. Alternate trips of the roller shall be of slightly different lengths. Rollers shall move at a slow but uniform speed with the drive roll or wheel nearest the paver. Speed of the rollers shall not exceed 3 miles per hour for steel-wheeled rollers or 5 miles per hour for pneumatic-tired rollers.

C. Initial Rolling: The initial rolling shall immediately follow the rolling of the longitudinal joint and edges. Rollers shall be operated as close to the paver as possible without causing undue displacement. Preliminary tests of crown, grade and smoothness shall be made immediately after the initial rolling.

D. Second Rolling: The second rolling shall follow the initial rolling as closely as possible, while the mixture is hot and in condition suitable for proper compaction. Rolling shall be continuous (at least 3 complete coverages) after the initial rolling until the mixture has been compacted. Causing undue displacement will not be permitted.

E. Finish Rolling: Finish rolling shall be done while the mixture is warm enough for the removal of roller marks. Rolling shall continue until all roller marks are eliminated and the course has the specified density.

F. Patching Deficient Areas: Bituminous-concrete mixtures that become mixed with foreign material or that are defective, such as low areas or "bird-baths," shall be removed, replaced with fresh bituminous-concrete mixture to obtain the required grade and smoothness for the finished surface, and compacted to the specified density. Pavement in deficient areas shall be removed to the full thickness of the bituminous-concrete course and so cut that the sides are perpendicular and parallel to the direction of traffic and the edges are vertical. Edges shall be sprayed with bituminous tack-coat material. Skin patching an area that has been rolled will not be permitted.

G. Protection of Pavement: After final rolling, vehicular traffic shall not be permitted on the pavement until the pavement has cooled and hardened and in no case sooner than 6 hours.

3.06 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 25-foot straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch.

3.07 FIELD QUALITY CONTROL

A. Field testing will be performed under provisions of Section 01400.

B. Take samples and perform tests as listed herein.

C. Perform the following tests:

1. Density: For each 1000 tons of bituminous mixture placed, determine the representative laboratory density in accordance with ASTM D 1559. Samples for laboratory specimens shall be taken from trucks delivering mixture to the site; record in a manner approved by the Contracting Officer the project areas represented by the laboratory densities. From each representative area recorded, determine field density of pavement by densities of 4-inch diameter cores obtained from leveling, binder, and wearing courses; take three cores for each 1000 square yards or fraction thereof of course placed. Determine density of laboratory prepared specimens and cored samples in accordance with ASTM D 1188 or ASTM D 2726, as applicable. Separate pavement layers by sawing or other approved means. **Minimum Density shall be 96 % of the representative laboratory density**. Pavement with a density less than 96% will be rejected. No averaging of densities will be considered.

2. Thickness: Determine thickness of binder and wearing courses from samples taken for the field density tests. **The maximum allowable deficiency at any point shall not be more than 1/4-inch less than the thickness for the indicated course**. Average thickness of course or of combined courses shall be not less than the indicated thickness.

3. Smoothness: Straightedge test the compacted surface of leveling, binder, and wearing courses as work progresses. Apply straightedge parallel with and at right angles to the centerline after final rolling. Unevenness of leveling and binder courses shall not vary more than 1/4-inch in 10 feet; variations in the wearing course shall not vary more than 1/8-inch in 10 feet.

4. Finished Grades: Finish grades of each course placed shall not vary from the finish elevations, profiles, and cross sections indicated by more than 1/2 inch. Finished surface of the final wearing course shall be tested by running lines of levels at intervals of 25 feet longitudinally and transversely to determine elevations of completed pavement. Within 45 days after completion of final placement, perform a level survey at the specified grid spacing and plot the results on a plan drawn to the same scale as the drawings. Elevations not in conformance with the specified tolerance shall be noted on the plan in an approved manner. The Contracting Officer will inform the Contractor in writing of paved areas that fail to meet the final grades indicated within the specified tolerances. Skin patching for correcting low areas is prohibited.

5. Finish Surface Texture of Wearing Course: Visually check final surface texture for uniformity and reasonable compactness and tightness. Final wearing course with a surface texture having undesirable irregularities such as segregation, cavities, pulls or tears, checking, excessive exposure of coarse aggregates, sand streaks, indentations, ripples, or lack of uniformity shall be removed and replaced with new materials.

D. Correction of deficiencies: All deficiencies will be corrected by removal and replacement of the deficient pavement. Limits of replacement will be determined by additional testing as required to define the area of

deficiency. All testing will be the responsibility of the contractor. All replacement will be full lane width with a minimum length equal to the lane width.

END OF SECTION

SECTION 02529 PORTLAND CEMENT CONCRETE PAVEMENT

PART 1 - GENERAL

1.01 RELATED SPECIFICATION SECTIONS

A. section 01000 - GENERAL REQUIREMENTS

1.02 SUMMARY

A. The work specified herein consists of the construction of Portland Cement Concrete Pavement. The work shall be performed in accordance with this specification and shall conform to the lines, grades, mates and typical sections shown in the plans. This section also includes reinforcing steel bars, wire fabric and accessories for cast-in-place concrete.

B. Portland Cement Concrete Pavement, as used herein, is a mixture of Portland Cement, aggregates, water and admixtures uniformly blended and placed to produce a pavement which meets all criteria as set forth in the plans and specifications.

1.03 REFERENCES

A. Specific tests as specified herein:
   1. ACI American Concrete Institute
   2. ANSI American National Standards Institute
   3. ASTM American Society For Testing And Materials
   4. AWS American Welding Society

1.04 SUBMITTALS

A. Mix Designs (Contractor and Job)
   1. Contractor Furnished Mix Design: At least 30 days prior to the mixing and placing of any concrete, submit for approval concrete mix design with test reports which show the results of tests for the specified materials and results of the 7-day and 28-day flexural strength tests of the concrete. The mix design shall be based on aggregate gradation and specific gravity results determined by a laboratory within the past 6 months. If test results are not available, aggregates shall be sampled and tested.
   2. Mix Certification: At the expense of the Contractor and before concrete is placed at the job site, each concrete mix design shall be evaluated and certified by an approved engineering testing laboratory. The laboratory's certification shall include but not be limited to the following:
      a. Confirmation of aggregate test data.
      b. Evaluation of Mix Designs: Check calculations. Report the following: cement factor, pounds per yard; standard deviation used in design of mix; maximum water, gallons per bag of cement; percentage of fine aggregate to total aggregate by weight; volume of admixture; and yield for one cubic yard of concrete.
      c. Statement that the selected cement-factor and proposed water-cement ratio for field production of concrete will or will not-provide the specified strength.
      d. Statement of recommended approval or disapproval of mix design.

B. Certified Test Reports: Before delivery of materials, submit three copies of certified test reports for the following listed materials:
   1. Aggregates
   2. Admixtures
   3. Materials for curing concrete

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
   1. Steel Reinforcing

1.05 DELIVERY AND STORAGE OF MATERIALS

A. Cement: Store cement immediately upon receipt. Store cement in bags in a suitable airtight and waterproof structure; floors shall be elevated above the ground a distance sufficient to prevent the absorption of moisture. Bags shall be stacked close together to reduce circulation of air but shall not be stacked against outside walls; the manner of storage shall permit easy access for inspection and identification of each shipment. Bulk cement shall be transferred to elevated airtight and weatherproof bins. At the time of use, all cement shall be free-flowing and free of lumps. Cement that has been in storage longer than 6 months shall not be used without approval of the Contracting Officer.

B. Aggregates: Store aggregates in a manner to minimize segregation and prevent contamination of the aggregates. To preclude the inclusion of contaminants, the aggregates may be stored on areas covered with tightly laid wooden planks, sheet metal, or other hard and clean surface. Store aggregates of different sizes in separate piles. Stockpiles of coarse aggregates shall be formed by spreading the materials in thin, horizontal layers not exceeding 5 feet in depth. Stockpiling may be the single-core type, cast and spread type or truck-dumped type. Should the coarse aggregates become segregated, re-mix the stockpile to conform to the specified grading requirements.

C. Admixtures: Store admixture in a manner that will not damage the containers and which will prevent evaporation. An air-entraining admixture which has been in storage for longer than 6 months or which has been subject to freezing shall not be used. All other types of admixtures which have been stored longer than 15 months shall not be used.

1.06 GRADE AND SURFACE-SMOOTHNESS REQUIREMENTS

A. The finished surface of pavements shall conform to the elevations provided in the contract drawings. The following smoothness requirements are applicable:

GRADE CONTROLS FOR AIRFIELD PAVEMENT
OPERATING SURFACES

Pavement Category	Longitudinal	Transverse
Runway	Max Grade 1.0%.	Max Grade 1.5% Min Grade 1.0%
Taxiway	Max Grade 1.5%.	Max Grade 1.5% Min Grade 1.0%
Apron	Max Grade 1.5% Min Grade 0.5%	Max Grade 1.5% Min Grade 0.5%
Other	Same as Apron	Same as Apron

Notes:
(1) On runways, the maximum rate of longitudinal grade change is produced by vertical curves having 609 foot lengths for each percent of algebraic difference between two grades. A grade change is not allowed within the first 3000 feet from the runway end.
(2) On runways, the transverse grade is to remain constant except at intersections where pavement surfaces must be warped.
(3) On taxiways, the minimum distance between two points of intersection for a change in grade is 1500 feet. Changes in grade are done using vertical curves.

B. Grade Control: Line and grade shown on contract drawings shall be established and maintained by the Contractor. Elevations of bench marks at the site of work will be determined, established, and maintained by the Government.

C. Plan Grade: Finished surfaces shall conform to the grade and cross sections indicated on drawings. Deviations from the plan elevation will be permitted only where the proper functioning of drainage, appurtenant structures, or matching to existing pavement elevation is required.

D. Surface Smoothness: Finished surfaces shall not deviate from the testing edge of a 12 foot straightedge more than tolerances shown for the respective pavement category below:

SURFACE SMOOTHNESS TOLERANCES

Pavement Category	**Direction of Testing**	**Allowable Tolerance**
Runway and Taxiway	Longitudinal	1/8 inch
	Transverse	¼ inch
Calibration Stands and	Longitudinal	¼ inch

Compass Swing Bases	Transverse	¼ inch
All Other Airfield Areas	Longitudinal	¼ inch
	Transverse	¼ inch

E. Edge Slump: Edge slump is the downward movement of the concrete along the pavement edge measured not more than 1.0 foot from the free edge. When a slip-form paver is used, 85 percent of the pavement, within a distance of one full slab length, shall have an edge slump less than ¼ inch, and 100 percent of the pavement, within a distance of one full slab length, shall have an edge slump less than 3/8 inchles. The use of paving equipment and/or procedures that fail to provide pavement edges within the above limitations shall not be allowed.

1.07 SURFACE EVALUATION TECHNIQUES

A. The finished surface shall be evaluated for conformance with the plan grade and surface smoothness and edge slump by the contractor.

B. Equipment: The contractor shall furnish and keep at the jobsite one 12 foot straightedge for each operating paver. The straightedge shall be used for testing the surface smoothness and/or edge slump of placed concrete. Wood shall not be used. The straightedge shall have a flat bottom and shall be adequately rigid to assure accuracy.

C. Surface-Smoothness Determinations: When the concrete is hard enough to walk upon without damage to the surface, but not later than 24 hours after placement, the contractor shall test the pavement surface for smoothness. The testing will be observed by the Government. Testing shall be accomplished using a 12 foot straightedge which shall be placed to reveal surface irregularities. The entire area of the pavement shall be tested in both the longitudinal and transverse direction. The straightedge shall be held in contact with the surface and moved ahead one-half the length of the straightedge for each successive measurement and continuing across transverse joints.

D. Edge Slump Determination: When the concrete will support walking without damage to the surface, the pavement shall be tested by the contractor with a 12 foot straightedge. The edge slump shall be determined at each free edge of each paving lane. The straightedge will be placed transverse to the direction of paving with the end of the straightedge at the free edge of the paving lane. Measurements will be made at increments of not more than one slab length.

1.08 SURFACE DEFICIENCIES AND CORRECTIONS

A. High areas: High areas less than ¼ inch may be reduced by grinding the hardened concrete. Grinding shall only be accomplished when the concrete can support the weight of the equipment without damage to the surface. High areas exceeding ¼ inch must be corrected by removal and replacement. Cold planing of the deficiency will not be allowed unless approved by the Contracting Officer. Removal and replacement will be per paragraph 1.08.

B. Low Areas: Areas exceeding the tolerance specified will be removed and replaced per paragraph 1.08.

C. Excessive Edge Slump: Adding concrete to or otherwise manipulating the fresh concrete shall not be used as a method to correct edge slump. Edge slump shall be corrected by adjustment of the concrete mixture or the paving machine. Where edge slump exceeds the allowable, the placed concrete exceeding the limits of edge slump shall be removed and replaced per paragraph 1.08.

1.09 REMOVAL AND REPLACEMENT OF CONCRETE PAVEMENT

A. Removal will be across the full width of the pavement lane or to the nearest planned longitudinal joint when multiple lanes are placed. Removal shall be to the nearest planned transverse joint which isolates the deficiency. Replaced sections will be tied to the adjacent sections as directed by the Contracting Officer.

PART 2 - PRODUCTS

2.01 PORTLAND CEMENT

A. Cement to be used or furnished under this specification shall be Portland cement, conforming with the requirements of ASTM C-150, Type I, II, or III, or Portland Pozzolan Cement, conforming with the requirements of ASTM C-595. Pozzolanic materials shall not be used as a directly added ingredient in concrete in combination with Portland Pozzolan Cement.

2.02 WATER

A. Water for mixing and curing shall be fresh and clean. Turbidity of the water shall not exceed 2,000 parts per million.

2.03 AGGREGATES

A. Alkali Reactivity: Aggregate shall be free of substances that are deleteriously reactive with the alkalis in the cement in an amount sufficient to cause excessive expansion of the concrete. Acceptability of the aggregate shall be based upon satisfactory evidence furnished by the Contractor that the aggregate is free from such materials. Such evidence shall include service records of concrete of comparable properties under similar conditions of exposure and/or certified records of tests by an approved testing laboratory. Tests shall conform to Method of Test for Potential Reactivity of Aggregates (Chemical Method), ASTM C289. Aggregates shall be washed before use.

B. Fine Aggregates: Fine aggregate is defined as clean granular material which passes an ASTM Number 4 Standard Sieve size and shall conform to ASTM C33, except as otherwise modified herein. Fine aggregates from different sources of supply shall not be mixed or stored in the same stock pile nor used alternately in the same concrete mix. Grading shall conform to ASTM C33. The maximum limitation of the fineness modulus of 3.1 specified in ASTM C 33 is not applicable and may be exceeded. The fineness modulus shall not be less than 2.3. Fine aggregate shall be natural sand(s) or a blend of mechanical (manufactured) sand and natural sand(s).

C. Coarse Aggregates: Coarse aggregate is defined as that material retained on and above the Number 4 ASTM Standard Seive size and shall conform to ASTM C33 except as otherwise modified herein. The grading requirements for coarse aggregates of ASTM C 33 do not apply and shall be as specified herein.
   1. The abrasion loss shall not exceed 40 percent for aggregates tested in accordance with ASTM C131.
   2. Deleterious Substances: Requirements of Table 3 as given in ASTM C 33 apply, except the deleterious substances in course aggregate shall not exceed the following percentage by weight when tested in accordance with the tests designated in ASTM C 33: Maximum percent by weight of total samples Clay lumps including friable particles 1.0 +/- 0.5.
   3. Coarse aggregate shall be washed and shall consist of crushed stone.
   4. Particle shape of the coarse aggregate shall be generally cubical in shape. Size should be 1.5" for pavement depths greater than 10 inches and 1" for depths less than 10 inches. The quantity of flat and elongated particles in any size group shall not exceed 0 percent, by weight, as determined by CRD-C-19. A flat particle is defined as one with a ratio of width to thickness greater than three. An elongated particle is one having a ratio of length to width greater than three.
   5. The nominal maximum aggregate size shall be 1-1/2 inch, Class designation 4M as defined in ASTM C-33.

D. Blending Sizes: Blending sizes are defined as intermediate size particles nominally passing the 3/8 inch sieve and retained above the ASTM Number 50 Standard Sieve size.
   1. Blending sizes shall be washed clean materials of either natural deposits, manufactured products, or combinations thereof.
   2. Blending sizes shall meet the limits of deleterious substances and/or physical property requirements of ASTM C-33 based upon the aggregate sizes. Material which is of the coarse material size, by definition, shall meet coarse aggregate quality requirements. The material portion which meets the definition of the fine aggregate shall meet the quality requirements of the fine aggregate.
   3. The particles shall be generally cubical in shape without the presence of elongated or slivered materials.

2.04 ADMIXTURES

A. Use of Admixtures must be approved by Contracting Officer.
   1. Air-Entraining Admixtures: The air-entraining admixture shall conform to ASTM C260 and shall consistently entrain the air content in the specified ranges under field conditions. The air-entraining admixture shall be in a solution of suitable viscosity for field use.
   2. Chemical Admixtures: ASTM C494, Type B - Retarding or Type A - Water Reducing. Submit for government approval, test reports from a laboratory approved by the Contracting Officer certifying that the proposed admixtures, when combined with the cement and aggregates to be used, will produce the specified concrete having the desired properties with respect to retardation, water content, slump and strength.
   3. Pozzolans: Pozzolanic materials to be used in concrete or furnished under this specification shall conform to the requirements of ASTM C618 for Class F or Class C. If an approved pozzolanic material is used, the weight of flyash in the mix shall not exceed 10 percent determined by dividing the weight of flyash by the weight of portland cement.

2.05 MATERIALS FOR CURING CONCRETE

A. Waterproof Paper: Shall conform to ASTM C171, regular color.

B. Polyethylene Sheeting shall not be used.

C. Polyethylene-Coated Waterproof Paper Sheeting shall not be used.

F. Polyethylene-Coated Burlap: Shall conform to ASTM ClJ1.

E. Liquid Membrane-Forming Compound: Shall conform to ASTM C309, white-pigmented Type 2, Class B, and be free of paraffin.

F. Liquid Chemical Curing Compound: Shall be a compound which shall restrict the loss of moisture and properly cure the surface of the concrete. The chemical compounds shall be free of petroleum resins or waxes. The application of the chemical compounds shall be at the coverage recommended by the manufacturer, and the loss of moisture when determined in accordance with ASTM C156 shall not exceed 0.055 gram per square centimeter of surface. The abrasion loss if any shall not exceed 80 percent of that of the same concrete, untreated, when tested in accordance with ASTM C418 at age of 28 days.

2.06 REINFORCEMENT

A. Reinforcing Steel: ASTM A615, 40 ksi yield grade; plain and deformed billet steel bars.

B. Reinforcing Steel Mat: ASTM A704, ASTM A615, 40 ksi.

C. Stirrup Steel: ANSI/ASTM A82, plain finish.

D. Welded Steel Wire Fabric: ASTM A185 Plain Type ASTM A497 Deformed Type; in flat sheets.

E. Tie Wire: Minimum 16 gage annealed type.

F. Chairs, Bolsters, bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture.

G. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel type; size and shape as required.

H. All reinforcement shall be free from loose, flaky rust, loose scale, oil, grease, mud, or other coatings that might reduce the bond with concrete. Removal of this powdery rust and tight rust is not required; however, reinforcing steel which is rusted to the extent that it does not conform to the required dimensions or mechanical properties shall not be used.

I. Dowels: Dowels shall be fabricated or cut to length at the shop or mill before delivery to the site. Dowels shall be free of loose, flaky rust and loose scale, and shall be clean and straight. Dowels may be sheared to length provided that the deformation from true shape caused by shearing does not exceed 0.04 inch on the diameter

of the dowel and does not extend more than 0.04 inch from the end of the dowel. Dowels shall be plain steel bars conforming to ASTM A 615, grade 40 or 60; ASTM A 616, grade 50 or 60, or ASTM A617, grade 60, or shall be steel pipe conforming to ASTM A120, extra strong, as indicated. Split dowels shall be of the threaded type, of approved design. The external and internal threaded portion of the split dowels shall conform to the thread designation given in the tabulation below. When 3-piece split dowels are furnished, the minimum coupling length shall be as indicated below:

Dowel Diameter in Inches	Thread Designation	Minimum Coupling Length in Inches
¾	7/8-9-UNC-2A-RH	2
1	1 1/8-7-UNC-2A-RH	2 ½
1 ¼	1 3/8-6-UNC-2A-RH	3
1 ½	1 ¾-5-UNC-2A-RH	3 ¾
2	2 ½-4 ½-UNC-2A-RH	4 ¾
3	3 ¼-4-UNC-2A-RH	6 ¾

1. The minimum length of each external threaded portion of the split dowels shall not be less than the nominal diameter of the dowel. Split dowels, when assembled in place, shall be straight with length as specified, and shall have all external threads enclosed. End faces of couplings and of female portions of split dowels shall be squared to assure proper alignment of the dowel during installation.

J. Fabrication:
1. Fabricate concrete reinforcing in accordance with ACI 318.
2. Weld reinforcement in accordance with ANSI/AWS D12.1
3. Locate reinforcing splices not indicated on Drawings, at point of minimum stress.

2.07 FORMS

A. General Requirements: Construct forms of metal, except that flexible or curved forms may be metal or wood on curves having a radius of 150 feet or less and for fillets. Forms shall be of the full depth of the concrete and of a strength, when staked, sufficient to resist the pressure of the concrete and the loads resulting from the finishing operations without springing, settling, or losing their shape. All forms shall be free of bulge and warp, and shall be cleaned thoroughly before being reused. Before placing the concrete, coat the contact surfaces of forms with a non-staining mineral oil.

B. Side Forms: Place side forms only on underlying material that is at the proper grade. Set the side forms for full bearing on the foundation for the entire length and width and to the alignment of the edge of the finished pavement. Support the forms during the entire operation of placing, compaction, and finishing the pavement in such a manner that the forms will not deviate vertically more than 0.01 foot from the required grade and elevations indicated on the drawings. The maximum vertical deviation of the top of any side form, including joints, shall not exceed 0.01 foot from a 12-foot straightedge, nor shall the inside face vary more than 0.02 foot from a 12-foot straightedge. Stake sockets and interlocking devices shall be in such condition that they will prevent movement of the form.

C. Metal Forms: Use metal forms free from irregularities, dents, and sags. The top face of the form shall not vary from the plane of the face by more than one-eighth inch in 10 feet, and the lateral variation shall be not greater than one-fourth inch in 10 feet.

D. Wood Forms: Use wood forms made of plywood or well-seasoned lumber. Planks shall have a nominal thickness of not less than 2 inches and shall not vary on their edges more than one-eighth inch in 5 feet from the plane of the curve indicated on the drawings. The top face of the form shall not vary from the plane of the face by more than one-eighth inch in 10 feet.

2.08 ACCESSORIES

A. Joint Filler: Shall be preformed materials conforming to ASTM D1751 or D1752.

B. Epoxy Resin: All epoxy resin materials shall be two-component materials conforming to the requirements of ASTM, C181, class as appropriate for each application temperature to be encountered, except that in addition, the materials shall meet the following requirements:
1. All materials shall have a 24-hour absorption not greater than 1 percent.

2. The materials for bonding freshly mixed Portland cement concrete or mortar or freshly mixed epoxy resin concrete or mortar to hardened concrete shall be Type II materials, grade as approved.
3. The materials for use as patching materials for complete filling of spalls, wide cracks, and other voids; for use in embedding dowels and anchor bolts, and for use as a binder in preparing epoxy resin mortars and concretes, shall be Type I I I materials, and shall, in addition, meet these requirements: (a) the bond strength at 14 days (moist cure) shall be at least 1000 psi, and (b) the volatile content, cured system, shall not exceed 3 percent. Grade shall be as approved except that Grade 3 shall be used for embedding dowels in hardened concrete.

2.09 CONCRETE MIX

A. Design concrete based on procedures derived from ACI 211.1, except as modified herein. Acceptance of concrete shall be based on requirements in paragraph, Field Sampling and Testing. Mix design shall take into consideration the coefficient of variation of the concrete batch plant and method of placement of the concrete. In the event such data is not available, a coefficient of variation of 10 percent and a probability of one test in ten falling below the specified strength shall be assumed in the design, except that the mix design during the progress of the work shall reflect actual concrete plant standard deviations and the mix design adjusted to assure concrete conforming to the specified requirements. The results of all trial batches, the standard deviation, estimated production rates, and number of daily tests shall be submitted with the mix design. Admixtures proposed for use in the mix will be permitted, provided they meet the requirements specified herein. The mix design shall be as specified herein under Submittals and conform to the following:

1. Minimum Flexural Strength 28 Days (psi): 650.
2. Maximum Aggregate Size (inches): 1 1/2".
3. Maximum Water-Cement Ratio (by weight): 0.50.
4. Range in Slump (Inches): 1-2. (0-1 for slipform pavers).
5. Allowable air content: 6.0 +/- 1.5 percent by volume.
6. The minimum cement factor is required for durable concrete with local aggregates but may be insufficient to obtain the specified strength; in that case, the Contractor shall increase the cement factor as necessary without additional compensation under the contract.

PART 3 - EXECUTION

3.01 BASE PREPARATION

A. Before concrete is placed, the surface of the base shall be brought to finish grade and elevations as shown. The fine grading equipment shall be equipped with adjustable steel cutting devices capable of accurately producing the required surface. Fine grading of cement treated bases shall be completed prior to initial hardening of the base material.

3.02 FORMING

A. Setting and Removing Forms Not Specified Otherwise: The forms shall be joined neatly and tightly, staked securely to line and grade, and braced firmly throughout. Where practicable, set forms at least 500 feet in advance of the point where concrete is being placed. Oil forms thoroughly before concrete is placed against them. Forms shall remain in place for at least 12 hours after concrete has been placed against them. After form removal and until the end of the curing period, the sides of the pavement shall be protected with moist earth or by other approved methods. Remove forms in a manner to preclude damaging the concrete.

B. Planer: A planer mounted on rollers riding the forms or on previously constructed slabs, or a power grader operating between forms shall be provided for shaping the final surface of the underlying material. The power grader or power equipment used to pull the planer shall not produce ruts or indentations in the material. Before forms are set, final surface grading may be completed with automatic planer controlled for both direction and grade. Surface of base material shall not vary more than plus or minus 0.02 foot from the indicated elevations. When riding on previously constructed slabs, the planer shall be operated to prevent damage to surfaces or edges of the existing concrete.

C. Templates: Provide a scratch template for checking the contour of the underlying material. Mount a template of rigid construction on wheels that are supported on side forms or on concrete in adjacent lanes. Provide on the template adjustable rods projecting downward to the surface of the material and at maximum one foot intervals. Adjust the rods to the required cross section at the bottom of the slab when the ends of the template

are supported on the side forms or on concrete in the adjacent lanes. Check the Template frequently during use to assure that the rods are in the correct position.

D. Grade Between Forms: Remove from the surface of the underlying material all foreign matter, waste concrete, cement, and debris. Finish the surface of the underlying material to the required section as shown on the drawings. Test the prepared surfaces with a template, after which maintain the surface in a smooth, compacted condition in conformity with the required section and established grade until concrete is placed. Wet the underlying material in advance of placing concrete to insure a firm, moist condition at the time concrete is placed. Do not permit equipment other than concrete delivery or paving equipment on the prepared underlying material located between forms. In cold weather protect the underlying material from frost when concrete is placed. The use of chemicals to eliminate frost in the underlying material shall not be permitted.

3.03 SLIP FORM CONSTRUCTION (Contractor's Option)

A. Use of a slip form paver is subject to specific approval by the Contracting Officer. The contractor shall provide a minimum of two references before consideration will be given by the government to allow the use of a slipform paver. The references must be for work accomplished in the past two years.

B. The contracting officer will allow use of slipform paving only when the contractor can demonstrate that positive control of the edge slump and surface finish can be maintained. The contractor shall place a test strip using that concrete, manpower, equipment, and people that will be performing the work. If the test strip is approved, procedures used to accomplish the test strip shall become the standard for the work. When a successful placement of concrete can not be attained with the slipform paver, the contractor will use fixed forms.

C. Base Preparation: Finish the base to the required section as shown. If the surface of the underlying material is to be used for grade and elevation control of the slip-form paver, the surface shall not vary more than plus or minus 0.02 foot from the elevations shown on the drawings. When the grade and elevation control of the slip form paver is established by a string line, the surface shall not vary more than plus or minus 0.04 foot. Remove from the surface of the underlying material, all foreign matter, waste concrete, cement, and debris. Wet the underlying material in advance of placing concrete to insure a firm, moist condition at the time concrete is placed. Do not permit equipment other than concrete delivery or paving equipment on the prepared underlying material. Fill and recompact all ruts, holes, or other indentations of the surface. Confirm the final grade immediately before concrete is placed.

D. Paving Equipment: Slip-form paving equipment shall be a self-propelled, automatically controlled, full tracked, concrete paving, finishing machine, capable of spreading and shaping the plastic concrete to the specified cross-section in one pass, and consolidating concrete to the specified cross-section in one pass, and consolidating concrete mixtures as low as O-inch slump. The paver shall screed and finish the freshly-placed concrete in such a manner that a minimum of hand finishing is required. Paver shall be equipped with horizontal auger for pre-leveling plastic concrete to provide a uniform distribution for the slip form paver.

E. Slip-Form Construction: Uniformly distribute concrete without delay into final position by a slip-form paver. For the full paving width, consolidate the concrete by internal vibration with transverse vibrating units or a series of longitudinal vibrating units. If a series of longitudinal vibrating units are used, they shall be spaced at intervals not to exceed 2-1/2 feet, measured center to center.
   1. Internal Vibration: The term "internal vibration" shall mean vibration by means of vibrating units located within the thickness of pavement section. The rate of vibration of each vibrating unit shall be not less than 8,000 vibrations per minute in the concrete, and the amplitude of vibration shall be sufficient to be perceptible on the surface of the concrete along the entire length of the vibrating unit and for a distance of at least one foot therefrom. The Contractor shall furnish a tachometer or suitable device for measuring and indicating the actual frequency of vibrations.
   2. Equipment Support: When concrete is being placed adjacent to an existing pavement and part of the equipment is supported on the existing pavement, provide protection to prevent damage to the previously constructed pavement, such as installing protective pads on crawler tracks or rubber-tire wheel and operating the equipment a sufficient distance from the pavement edge.
   3. Alignment: No abrupt changes in longitudinal alignment of the pavement will be permitted. The horizontal deviation shall not exceed 0.10 foot from the established alignment of the pavement edge. Horizontal alignment shall be referenced to a taut string line or the surface of the underlying material.

F. Widths Less Than A Traffic Lane: Concrete required to be placed in widths less than a traffic lane may be compacted and shaped by a powered mechanical compacting and shaping machine, except that a transverse tube (pipe) compactor shall be subject to approval of the Contracting Officer. Consolidation shall be supplemented with vibratory compactors. Where hand compaction is performed, construct a tamper of heavy plank with length that exceeds the width of the pavement by a minimum of one foot, shod with a heavy strip of metal for a tamping surface, and stiffened adequately to maintain the required shape during use. For concrete production in excess of 40 cubic yards per hour, and where all compaction is performed by hand methods, use at least two tampers.

G. Locations Inaccessible to Slip-Form Paving Equipment: Locations inaccessible to slip-form paving equipment shall be constructed as specified herein under "Conveying and Placing Concrete".

3.04 REINFORCEMENT

A. Place, support and secure reinforcement against displacement. Do not deviate from required position. Do not displace or damage vapor barrier. Accommodate placement of formed openings. Maintain concrete cover around reinforcing equal to at least 150% of the maximum aggregate size or 1 1/2 inches, whichever is greater.

3.05 PROPORTIONING AND MIXING CONCRETE

A Proportioning Concrete: Proportion concrete in accordance with the approved mix design. Except when failures of equipment or other unusual circumstances necessitate the temporary use of volumetric proportioning, all concrete shall be proportioned by weighing.

B. Volumetric Proportioning: When volumetric proportioning is required, the weight proportions in the mix design shall be adjusted into equivalent volumetric proportions by weighing representative samples of the aggregates in the conditions in which they will be measured and in accordance with ASTM C 29. In determining the true volume of the fine aggregate, allowance shall be made for the bulking effect from the moisture contained therein.

C. Concrete Equipment: In order to meet the plan and schedule of paving operations, select the number and sizes of units to accomplish the work. Maintain the concreting equipment in good condition. Assemble the equipment at a time sufficient to permit thorough inspection, calibration of weighing and measuring devices, adjustments of parts, and the making of any necessary repairs for satisfactory performance prior to the start of paving. Plant mixers, truck mixers, agitators, and non-agitating units shall conform to the applicable industry standards. On request by the Contracting Officer, the Contractor shall submit a detailed check list for the inspection of the equipment.

D. Batching Facilities:
   1. Batching Plant: Shall include batcher, bins, weighing hoppers, pollution control collectors, and other weighing equipment. Support the structure for the bins and scales on firm foundation. Level and maintain the structure within the tolerances necessary for the proper operation of the weighing mechanism. Provide separate storage bins or compartments for fine aggregate and for each size of coarse aggregate with ample capacity and proper arrangement to preclude mixing of stored aggregates, under all working conditions. All weigh scales, remote weighing systems and balances for separate and cumulative aggregate weighing shall conform to manufacturer's standard tolerances for separate aggregate batches.
   2. Product Control: Design and arrange bins, discharge gates and conveyors to facilitate free flow and efficient control of materials entering the weigh hoppers. Construct weigh hoppers to provide for removing an overload of any one of the materials, also provide controls of the hopper so that as the aggregate approaches the level desired in the hopper, the rate of flow can be slowed and finally the flow shut off with precision, avoiding over-runs.
   3. Plant Inspection: Assemble the plant to facilitate inspection of all operations at all times, and provide ready adjustment to compensate for varying moisture content of aggregate and for changing proportions of materials. Provide test weights or other equipment for calibrating and checking the measuring devices. The Contractor shall make all necessary corrections to secure satisfactory performance. Arrange the batching plant so that the weighing beam or dial and the aggregate discharge gates are in full view of the operator. Install glass windows to provide a view of mixer charging and discharging, truck loading positions, and water and additive gages. Scales shall be accurate within 1/2 of one percent. Design plant for capability of delivering quantities of aggregates within a limit of accuracy of 2 percent of the desired amount. Cement handled in bulk shall be transferred to separate weighing hopper capable of delivering quantities of bulk cement within a plus or minus tolerance of one percent. Provide canvas tremie or

curtains attached to the discharge hopper to prevent loss of cement when discharging into batch trucks or mixers. Bulk cement elevators shall be ;handled by pneumatic or screw conveyors. Bucket cement elevators shall not be used unless approved by the Contracting Officer. Cement in standard packages (bags) need not be weighed, but fractional packages shall be weighed.

4. Mixer and Agitators: Attach to each mixer and agitator in a prominent place, a metal plate or plates showing clearly the use for which the equipment is designed, the capacity of the drum or container in terms of the volume of mixed concrete, and the manufacturer's recommended speed of rotation of the mixing drum or blades. Examine mixers and agitators daily for changes in condition due to accumulations of hardened concrete or mortar or to wear of blades. Do not use mixer or agitator if the slumps of individual samples of concrete, taken from time to time at approximately the one-quarter and the three-quarter points of the load, differ by more than one inch the equipment may be used when operation with a longer mixing time or with a smaller load will permit the slump requirements to be met.
   a. Mixers: Provide batch type mixers, whether field-operated pavers, central mix plants, or truck mixers. The mixing equipment shall be capable of combining the aggregates, cement, and water within the specified time into a thoroughly mixed and uniform mass, and of discharging the mixture without segregation. The mixer shall have a rated capacity of at least 27 cubic feet of mixed concrete and shall not be charged with batches greater than the manufacturer's rated capacity. Construct and operate mixer so that water or any part of the mixture will not be lost while unit is in operation. Concrete uniformity shall conform to the criteria stated in Annex A1, ASTM C 94. Maintain concrete uniformity in rotating drum mixers by replacing pick-up and throw-over blades which are worn with new blades.
   b. Stationary Mixers: When stationary mixers are approved for use, the central plant mixers shall be single-drum or multiple-drum type. Equip mixers with a device for measuring and indicating the quantity of water entering the batch. The device shall prevent leakage of water when the valves are closed, and be able to measure within a range of error of not more than one percent. Provide for each mixer a vertical tank for mixing water, equipped with a gauge glass, graduated scale for reading in terms of weight, and a suitable overflow for regulating the filling of the tanks. Install a device for automatically measuring and indicating the time of mixing and an interlocking mechanism to prevent discharge of concrete before expiration of the required mixing time. Provide an automatic counter for indicating the number of batches handled. Install a sensor to verify the flow of admixture to the mechanical dispenser.
   c. Truck Mixers: Each tank mixer shall have a watertight drum suitably mounted and fitted with adequate blades capable of uniformly combining the mixture. Raise trailing dollies when not in use or when mixer load is being discharged. Provide a control switch for lowering or raising the booster axle to prevent lowering of the trailer after the load, or a partial load, has been discharged, unless a reset safety button is pushed. Provide a load adjustment control valve with a calibrated scale visible to the truck operator. Provide a revolution counter activator by the mixer drum. Provide truck mixers which will uniformly discharge low slump concrete. An inspection ladder shall be mounted on each mixer to permit ready inspection of the consistency of the concrete before discharging from drums.
   d. Water Storage Tanks: Measuring tanks on truck mixers shall include outside taps and valves to facilitate checking the calibration of water tanks for providing water within one percent accuracy of the amount of water in the tank. Enclosed tanks operated by air pressure shall be visibly marked or labeled with the degree of accuracy for measuring the amount of water leaving the tank. Water meters if used shall be protected by pressure relief valves. Sight gages on tanks shall meet accuracy requirements of plus or minus one, or 2 percent of the total quantity of mixing water in a: batch. At the job site the Contracting Officer may permit a small quantity of tempering water (not to exceed 2.5 gallons per cubic yard of concrete) to be added to the batch before discharging of the concrete provided the approved water-cement ratio is not exceeded. Locate water meters, gages, and other calibrated measuring devices on the pipe lines between the water tank and the mixer drum.
   e. Agitators: Agitators shall be truck mixers operated at a speed of rotation designed by the manufacturer as agitating speed, or truck agitators. Agitators, when loaded to capacity, shall be capable of maintaining the mixed concrete in thoroughly mixed and uniform mass and of !discharging the concrete at the specified slump.

5. Transportation Equipment: Vehicles used for transporting mixed concrete from a central mixing plant shall provide slow agitation of the concrete during transit, except that non-agitating equipment which will deliver the mixture in an unsegregated condition of uniform consistency may be used as specified herein. Concrete mixed and delivered in truck mixers is specified elsewhere.
   a. Non-Agitating Equipment: When non-agitating equipment is used to transport concrete, discharge shall be completed within 45 minutes after introduction of the mixing water to the cement and aggregates, except that when conditions contribute to quick stiffening of the concrete, the allowable time shall be reduced. Deliver concrete to the site of work in a thoroughly mixed and uniform mass as

determined in accordance with ASTM C 94, and discharged without segregation. Bodies of non-agitating equipment shall be metal, smooth, and watertight. If it rains or when the prevailing air temperature is 90 degrees F or higher, protect concrete being hauled with watertight covers. Slump limitation shall be as specified.

4. Spreaders: Dump concrete into an approved spreader when non-agitating equipment is used for transportation. The spreader shall be capable of distributing concrete uniformly over the entire width of the lane being paved. Concrete may be discharged by end dumping directly on the compacted grade in front of the paving machine providing the surface of the grade is not damaged by haul units.

G. Measurement of Materials: The fine aggregate, each size of coarse aggregate, and the cement shall be weighed separately. Cement in standard packages (bags) need not be weighed, but bulk cement or fractional packages shall be weighed. The Contractor shall furnish the necessary equipment and shall establish accurate procedures for determining the quantities of free moisture in the aggregates, the true volume of the fine aggregate if volumetric proportioning is used, and the air content of the freshly mixed concrete if air-entrained concrete is used.
   1. Chemical Admixtures: Measure the amount of chemical admixture by means of a device capable of ready adjustment to permit varying the quantity of admixture to be dispensed. Design and construct the device to accurately measure and dispense the required amount of admixture into the concrete mix. Keep different types of admixtures from intermixing prior to being mixed with other batch materials.

H. Mixing and Agitating:
   1. Mixing: Mix all concrete with machines, except in emergencies the mixing may be by hand as approved. Mixing shall begin within 30 minutes after the cement has been added to the aggregate or water to the cement and aggregates. The total elapsed time for batching, mixing, conveying, discharging, and placing the concrete in final position shall not exceed 1-1/2 hours for ambient temperatures below 90 degrees F, or 45 minutes for ambient temperatures above 90 degrees F, unless specified otherwise. Only concrete which conforms to the specified requirements and the approved mix design shall be discharged on the base. Once discharge has commenced, retempering the concrete with water will not be permitted. Excessive over-mixing which would require the addition of water to preserve the required consistency will not be permitted. The entire contents of the mixer shall be discharged before recharging. A discharge of separate aggregate at the end of the batch will be rejected and such material shall be removed from the site. Concrete shall be mixed by one of the following methods.
   2. Central Plant Mixing: The minimum mixing time for central plant mixing plants when stationary mixers are approved for use, shall be 80 seconds after all solid materials are in the mixer drum, and with all the mixing water introduced before one-fourth of the mixing time has elapsed. This mixing time may be reduced if mixer performance tests (ASTM C 94) indicate that satisfactory mixes can be achieved at a reduced mixing time. The rate of rotation of the mixer drum shall be the manufacturer's specified speed. When a stationary mixer is approved for use for partial mixing of the concrete (shrink-mixed), the mixing time in the stationary mixer shall be as specified herein.
   3. Truck Mixing: Mix and deliver concrete in a truck mixer. Charge the mixers with a ribbon-fed mixture of aggregates and cement, or in absence of facilities for ribbon feeding, charge the mixers with aggregates before aggregates before the cement. Charge the truck mixer with a batch size equal to the rated capacity of the drum. When mixing is begun during or immediately after charging, a portion of the mixing water, not in excess of that required to produce the minimum acceptable slump, shall be added ahead of, or with, the other ingredients.
      a. Mixing: After all ingredients, including water, are in the drum, initially mix the materials for not less than 70 nor more than 100 revolutions of the drum. Control mixing speed to not less than 8 rpm and not more than 18 rpm. After the initial mixing or after 30 to 75 revolutions of the drum, test the slump. If necessary add water only one time to produce the required slump; if additional water is added (from one to 2-1/2 gallons per cubic yard) continue the mixing for at least 5 to 10 more revolutions at drum speed of 16 to 18 rpm. Discharge of the concrete shall be completed within 11-1/2 hours or before the drum has revolved 300 revolutions, whichever comes First. Each batch of concrete delivered at the job site shall be accompanied by a time slip issued at the batching plant, bearing the time of departure therefrom and weight of aggregates, cement and water, and the signature of the weighmaster.
   4. Combination Central Plant and Truck Mixing (Shrink Mixing): Partially mix concrete in a central-plant mixer and complete the mixing in a truck mixer. In the central-plant mixer select a minimum mixing time required to intermingle the ingredients. In any event, do not exceed 45 seconds. Complete the mixing in a truck mixer as specified above under truck mixing.
   5. Agitating of Completely Mixed Concrete: Agitate completely mixed concrete from a central plant with an agitator or truck mixer operating at the speed of rotation designated by the manufacturer as agitating speed. Non-agitating equipment may be used when approved.

G. Ready-Mixed Concrete: For the purpose of this specification, ready-mixed concrete is defined as Portland-cement concrete produced regularly by a commercial establishment and delivered to the purchaser in the plastic state. Ready-mixed concrete may be used provided the plant has sufficient capacity and transportation equipment to deliver the concrete at the scheduled rate. The interval between batches shall not exceed 30 minutes. The plant must meet the requirements specified herein for equipment, measurement of materials, mixing and agitation. The plant must have records which indicate an average plant coefficient of variation (ACI 214) of not greater than 15 percent. Ready-mixed concrete not specified otherwise shall be mixed and delivered by one of the methods specified in this section. Provide batch delivery tickets in accordance with ASTM C 94.

3.06 CONVEYING AND PLACING CONCRETE

A. Conveying: Convey concrete from the mixer to grade as rapidly as practicable. Use side discharge conveyors, bridge roller conveyors, or other similar conveyor systems which will not cause segregation or loss of ingredients. Deposit concrete as nearly as practicable in its final position to avoid rehandling. At any point in conveying, the free vertical drop of the concrete from one conveyor to another shall not exceed 3 feet. For short distances, chuting is permitted from the transportation equipment. When trucks are permitted to operate on the Portland cement stabilized subgrade or base, concrete may be discharged in front of the paver. Clean conveying equipment before each run. Deposit concrete as soon as practicable after the forms have been oiled. Do not use concrete which has segregated in conveying or which was not protected from rainwater during a rain storm or rainy weather.

B. Placing, General: Concrete placement will not be permitted when weather conditions prevent proper placement and consolidation. Maintain drainage ditches, gutters and side drains to drain the base during the construction of the pavement. In unreinforced pavement, place concrete in one continuous operation for the full depth and width of the section between transverse joints. Place mooring eyes in accordance with Section 02561, "Joints, Reinforcement and Mooring Eyes in Concrete Pavements". If an emergency stop occurs within 7 feet of a previously placed expansion or contraction Joint, remove the concrete back to the joint. If an emergency stop occurs more than 7 feet from a previously placed expansion or contraction joint and if the concrete is placed on a Portland cement stabilized base, install a plain butt type transverse joint. If concrete is not placed on a Portland cement stabilized base, install a keyed construction joint with approved tiebars.
   1. Concrete Placement: Deposit concrete in its final location within 45 minutes from the time all ingredients are charged into the mixer and before initial set. Deposit in a manner that will require a minimum of rehandling. At the Contractor's option, concrete may be placed between stationary forms or constructed to the desired cross section using slip-form pavers. All work incidental to the handling and placing of concrete shall be done in a manner that will not damage the underlying surface. Dampen the underlying surface before placing concrete. Place concrete continuously at a uniform rate without unscheduled stops except for equipment failure or other emergencies. Care shall be exercised to avoid contamination of plastic concrete with foreign material on construction equipment or workman's footwear. Concrete spread by hand shall be done with shovels and not with rakes. Immediately fill with fresh concrete any holes left on removing any excess material or removing joint-forming devices. Thoroughly compact concrete adjacent to the forms and at joints.

C. Vibration: Immediately after spreading concrete, consolidate with internal vibrating equipment concrete adjacent to forms and joints regardless of slab thickness, and concrete slabs 8 inches or more in thickness. Limit the duration of vibration to that necessary to produce consolidation of the concrete. Excessive vibration will not be permitted and generally vibrators shall not be operated in the concrete at one location for more than 15 seconds. At the option of the Contractor, vibrating equipment of a type approved by the Contracting Officer may be used to compact the concrete in unreinforced pavement slabs less than 8 inches thick.
   1. Vibrating Equipment: Operate equipment, except hand-manipulated equipment, ahead of-the front of the finishing machine. Select the number of vibrating units and power of each unit to properly consolidate the concrete. Mount the units on a frame that is capable of vertical movement and, when necessary, radial movement, as the vibrators may be operated at any desired depth within the slab or be completely withdrawn from the concrete. The clear distance between frame-mounted vibrating units that have spuds that extend into the slab at intervals across the paving lane shall not exceed 30 inches. The distance between the end of the vibrating tube and the side form shall not exceed 2 inches. For pavements less than 10 inches thick, the vibrators shall be operated parallel with or at a slight angle to the subbase. For thicker pavements, the vibrators shall be angled toward the vertical, with the vibrator tip preferably about 2 inches from the subbase, and the top of the vibrator a few inches below the pavement surface. The vibrators may be pneumatic, gas driven or the electric type, and shall be operated at frequencies within the concrete of not less than 8,000 vibrations per minute. The amplitude of vibration shall be such that

noticeable vibrations occur at 1.5-foot radius when the vibrator is inserted in the concrete to the depth specified.

D. Placing Concrete in Cold Weather: Except when authorized specifically by the Contracting Officer, concrete shall not be placed when the air temperature in the shade and away from artificial heat falls below 40 degrees F. or when the concrete without special protection is likely to be subject to freezing temperatures before the expiration of the specified curing period. When the concrete is likely to be subjected to freezing temperatures within 24 hours after it has been deposited, or when so directed, heat the concrete materials so that the temperature of the concrete when deposited is between 50 and 90 degrees F. Use methods of heating materials which will not cause deleterious effects to the concrete. Water for mixing shall not be heated above 165 degrees F.; however, if aggregates are not heated, the mixing water added to the aggregates may be heated to a maximum of 200 degrees F. prior to the addition of cement and provided the temperature of the concrete conforms to the above. For a period of 72 hours after placing, maintain the temperature of the concrete at 50 degrees F. or higher for a period of 72 hours, and at a temperature above freezing for the remainder of the curing period. Concrete damaged by freezing shall be removed and replaced at no additional cost to the Government. Additional recommended practices may be found in ACI 306.

E. Placing concrete in Hot Weather: Take extra care to reduce the temperature of the concrete being placed, and to prevent rapid drying of newly placed concrete. When the outdoor ambient temperature is more than 90 degrees F, the temperature of the concrete shall not exceed 95 degrees; and curing shall be started as soon as the surface of the fresh concrete is sufficiently hard to permit it without damage. Concrete placement temperatures shall be controlled by the Contractor at his expense and shall not be limited to: shading and cooling the aggregates; avoiding use of hot cement; cooling mixing water by additions of ice; insulating water supply lines and tanks; insulating mixer drums or cooling them with sprays or wet burlap coverings; working only at night; and addition of a retarder or water reducing retarder in the mix, if approved by the Contracting Officer. Reduce the temperature of side forms by aerating the forms with wet burlap or similar covering materials. Cool underlying material by sprinkling lightly with water. Additional recommended practices may be found in ACI 305.

F. Protection Against Rain: All mixing and batching operations shall stop and the surface of the unhardened concrete shall be covered with protective covering. The length of pavement to be protected shall extend back to a point where the rain is not indenting the pavement surface. When slipform construction is used, install side forms in those areas of pavement where the edge cannot otherwise be protected to prevent edge erosion. After the rain ceases, install side forms as required to prevent excessive edge slump, and remove the protective covering without delay. Any water that remains on the pavement surface shall be removed. Areas of the surface where the texture has been damaged or exhibits a smooth sandy appearance shall be retextured and cured if possible. Areas that cannot be retextured must be removed and replaced per paragraph 1.08 of this section.

3.07 FINISHING CONCRETE

A. General Requirements: Start finishing operations immediately after placement of concrete. Use finishing machine, except that hand finishing may be used in emergencies and for concrete slabs in inaccessible locations or of such shapes that machine finishing is impracticable. The surface of the pavement on both sides of a joint shall be finished to the same grade. Finishing formed joints from a transverse bridge securely supported. Provide hand finishing equipment for use at all times. Maintain finishing equipment and tools in a clean condition and free from hardened concrete or grout. When ambient conditions are such as to cause rapid loss of moisture from pavement surface, a uniform fog spray of water to restore the surface sheen may be applied during finishing operations. Avoid application of excessive amounts of water to the surface.

B. Side Form Finishing: Strike off and screed the concrete to the required crown and cross-section by a power-driven transverse finishing machine. Transverse rotating tube or pipe shall not be permitted unless approved by the Contracting Officer. The elevation of the concrete shall be such that, when consolidated and finished, the surface of the pavement will be adequately consolidated and at the required grade. Equip the finishing machine with two screeds readily and accurately adjustable for changes in pavement crown and compensation for wear and other causes. It shall make as many trips over each area of pavement and at such intervals as necessary to give the proper compaction, retain the coarse aggregate near the finished surface, and produce a surface of uniform texture, true to grade and crown. Excessive operation over an area, which results in an excess of mortar and water being brought to the surface, will not be permitted.
   1. Equipment Operation: Maintain the travel of machine on the forms without lifting, wobbling, or other variation of the machine which tend to affect the precision of concrete finish. Keep clean the tops of the

forms by a device attached to the machine. During the first pass of the finishing machine, maintain a uniform ridge of concrete 4 inches deep, ahead of the front screed for its entire length.

2. Joint Finish: Before the concrete is hardened, correct any edge slump of the pavement, exclusive of edge rounding, in excess of 0.02 foot. Finish the concrete surface on each side of the construction joints to the same plane; correct all deviations before the newly placed concrete has hardened. Slip-form finishing is specified below.

C. Hand Finishing: Strike-off and screed the surface of the concrete to elevations slightly above finish grade so that when the concrete is consolidated and finished, the surface of the pavement is at the indicated elevation. Vibrate the entire surface until the required compaction and reduction of surface voids is secured with a strike-off template.

D. Longitudinal Floating: After the initial finishing, further smooth and consolidate the concrete by means of hand-operated longitudinal floats. Use floats that are not less than 12 feet long and 6 inches wide and stiffened to prevent flexing and warping.

E. Slip-Form Finishing: After the concrete has been given a preliminary finish by means of finishing devices incorporated in the slip-form paving equipment, check the surface of fresh concrete with a straightedge device not less than 14 feet long. Remove high areas by the hand float method specified above. Finish the concrete surface on each side of the construction joints to the same plane. Correct all deviations before the newly placed concrete has hardened.

F. Straightedge Finishing: After completion of the longitudinal floating, any excess water or laitance shall be removed from the surface of the pavement transversely with a 10-foot straightedge or, where the use of a straightedge is not practicable, with a long-handled wood float having a blade not less than 5 feet in length and 6 inches in width. Do not use a wooden float to float the entire surface of the pavement in lieu of, or supplementing, the use of the longitudinal float, except as follows: when strike-off and consolidation is done by hand or if the crown of the pavement will not permit the use of a longitudinal float, the surface shall be floated transversely by means of the wood float.

G. Straightedge Testing: After the longitudinal floating has been completed and the excess water removed, but while the concrete is still plastic, test the slab surface with an accurate 10-foot straightedge swung from handles 3 feet longer than one-half the width of the slab. Hold the straightedge in successive positions to the centerline of the slab in contact with the surface of the concrete, and go over the whole slab area from one side of the slab to the other as necessary. Advance along the centerline of the slab in successive stages of not more than one-half the length of the straightedge. Fill all depressions immediately with freshly mixed concrete, strike-off, consolidate, and refinish. Cut down all high places and refinish. Straightedge testing and surface correction shall continue until the entire surface is within the tolerance specified.

H. Texturing: Before the surface sheen has disappeared and before the concrete becomes nonplastic, the surface of the pavement shall be given a texture as specified below for Surface Finish.

I. Surface Finish:
   1. Burlap Drag Finish: Before the concrete becomes non-plastic, finish the surface of the slab by dragging on the surface a strip of clean, wet burlap measuring from 3 to 10 feet long and 2 feet wider than the width of the pavement. Select the dimension of the burlap drag so that at least 3 feet of the material are in contact with the pavement. Drag the surface so as to |produce a finished surface with a fine granular or sandy texture without leaving disfiguring marks.

J. Edging: At the time the concrete has attained a degree of hardness suitable for edging, carefully finish all slab edges, including the edges at formed joints, with an edge having a maximum radius of one-eighth inch. Clean by removing all loose fragments and soppy mortar from corners or edges of slabs which have crumbled and areas which lack sufficient mortar for proper 'finishing. Refill the voids solidly with a mixture of suitable proportions and consistency, and refinish. Remove all unnecessary tool marks and edge. All remaining edges shall be smooth and true to line. Select tools, methods, and workmanship to produce joints having edges of the same quality as other parts of the pavement as approved by the Contracting Officer. After removal of forms, repair all damaged and honeycombed areas with mortar composed of one part Portland cement to two parts sand.

3.08 CURING AND PROTECTION

A. Protect concrete from injurious action by the sun, rain, flowing water, frost, or mechanical injury and prevent concrete from drying out from the time the concrete is placed until expiration of the minimum curing periods specified below. At the completion of the finishing and at the time the concrete surface has hardened enough to prevent the surface being marred by the curing material, cure the concrete by one of the following methods: Use fresh water for curing; keep moist and at a temperature above 50 degrees F, all portions of the pavement for the full-curing periods specified below. Protect the pavement from damage during removal of form work or from injury resulting from storage or transportation of materials and equipment during construction. Protect exposed vertical faces of concrete with curing compound or by other suitable means. During cold weather, use waterproof paper blankets specified below for initial curing.

B. Moist Curing:
   1. Mats: Cover the entire surface of the pavement with two thicknesses of wet burlap weighing not less than 7 ounces per square yard (dry weight), cotton mats, or other similar material having a high absorptive quality. Thoroughly wet the material when applied and keep continuously wet during the time the material remains on the pavement. Use mats made of clean material, free from any substance which will have deleterious effect on the concrete. The minimum length of mats shall be the width of the pavement plus four times the thickness of the pavement. Place mats to completely cover the pavement surface and edges of the concrete with a slight overlap over adjacent mats. During application, avoid dragging the mats on the finished concrete or over mats already placed. Leave the mats in the place not less than 8 hours, at that time remove the mats and continue curing by one of the other methods specified, or leave the mats in place for a total of 7 days and keep continuously wet.

C. Liquid Membrane-Forming Compound Curing: Apply the compound specified elsewhere in this Section on the concrete surface to restrict evaporation of the mixing water. Seal all joint openings at the top by inserting moistened paper or fiber rope or cover joints with strips of waterproof material prior to application of the curing compound in a manner to prevent the curing compound from entering the joint. Seven days after the application of the curing compound, the joints may be exposed and prepared to receive the joint sealant materials.
   1. Application of Curing Compound: Immediately apply the compound !after the surface loses its water sheen and has a dull appearance. Thoroughly agitate the curing compound by mechanical means during use and uniformly apply the compound in a two-coat continuous operation by power-spraying equipment. Apply two coat for a total coverage of 200 square feet per gallon of compound. If the compound lacks a uniform continuous, coherent film or exhibits checks, cracks, peels, or pinholes; apply an additional coat of compound to areas where the film is defective. Have readily available impervious sheet curing for use to protect the freshly placed concrete in the event conditions occur to prevent correct application of the compound at the proper time. Re-spray with two coats of curing compound the concrete surfaces subjected to heavy rainfall. Before application of the compound, prepare the surface as specified for "Protection Against Rain". Apply the two coats at the same method and rate required above.
   2. Protection of Treated Surfaces: Protect concrete surfaces from all foot and vehicular traffic and all other sources of abrasion for not less than 172 hours. Maintain continuity of the applied liquid membrane-forming coating for the entire curing period and repair damage to the coating during the curing period.

D. Special Requirements for High-Early-Strength Portland Cement Concrete: The minimum periods of maintaining temperatures above freezing when concrete is placed in freezing weather shall be not less than one-quarter of those specified herein for Portland-cement concrete, but in no case less than 48 hours.

E. Pavement Protection: Keep pavement closed to vehicular traffic until the concrete is not less than 7 days old and has attained a minimum flexural strength of 450 pounds per square inch as determined by tests of the field cured test beams. At that time the pavement may be opened to limited traffic. Prevent damage to edges of slabs if subgrade planer, concrete finishing machine, or similar equipment is supported on previously constructed slabs. After the concrete has reached the specified 28 days flexural strength as verified by the laboratory-cured test beams, equipment with wheel loads capacity exceeding 5000 pounds may be used for transporting concrete or heavy equipment.

F. Pavement Identification: Indent in the surface of the unhardened concrete the contract number and date of construction. Locate markings at each end of a lane and at every 1000 feet of pavement or fraction thereof. Select letters and numbers a minimum height of 1-1/2 inches. Form width of indentations not less than 1/4 inch and depth not less than 1/8 inch with -slightly bevel corners.

3.09 FIELD SAMPLING AND TESTING

A. Sampling:

1. Aggregates: Sample at the source the fine and coarse aggregates prior to delivery of aggregates to the batch plant. During concrete placement, sample coarse aggregates for each 1000 tons and fine aggregates for each 500 tons. Use sampling methods in accordance with ASTM D 75. Identify each sample for conformance tests. When test results indicate that the fine aggregates consistently meet the specified gradation requirements, the rate of sampling may be reduced if approved.
2. Concrete: Obtain samples of plastic concrete in accordance with ASTM C 172. Quality Control samples may be taken at the concrete batch plant; however, samples for verification of concrete strength and slump for submittal to the Government shall be taken at the job-site as the concrete is delivered in accordance with ASTM C 172. From each sample mold the required number of beams for each group of test specimens.
3. Sample Identification: Each sample shall be tagged for identification. The tag shall contain the following information:

   Contract No._____
   Sample No._____
   Date of Sample_____
   Sample_____
   Source_____
   Intended Use_____
   For Testing_____

B. Testing:
   1. Aggregate Testing: Without delay, perform gradation tests on each sample. Make all other aggregate tests, except durability tests, on initial source samples, and repeat tests including durability tests whenever there is a change of source. During progress of concrete placement, perform gradation tests for fine and coarse aggregates. Include sieve analysis for each fractional size and gradation analysis of the combined material representing the aggregate part of the concrete mix.
   2. Cement Testing: Submit the identity of the cement manufacturer, the engineering and chemical qualities of the cement, and a manufacturer's statement which states that the cement complies with the intent and requirements of this specification. The contractor, or the supplier, is prohibited from changing cement sources during the progress of the work without submitting the same information which qualified the original source. The submittal shall be made at least 10 days before starting a mixture proportioning study. When the contractor changes sources of cement, strength testing shall be accomplished as if the work were just beginning.
   3. Concrete Testing: Perform all tests with aggregates and cement to be used in the project. During the course of construction, if there is a deficiency in strength of the concrete produced, perform additional tests at the Contractor's expense and make adjustment in the mix, as required, to obtain the specified strength.
      a. Concrete Slump: Test consistency of concrete slump in accordance with ASTM C 143. Determine consistency of concrete at the start of each day's concrete placement and for each group of beam test specimens.
      b. Air Content: Determine air content at the start of concrete placement and for each group of beam test specimens. Record results with test specimens. Determine air content in accordance with ASTM C 173 or ASTM C 231.
      c. Temperature Tests: Determine temperature of plastic concrete in-place during hot and cold weather periods, at frequent intervals, until uniform and acceptable temperature control is established as specified.
      d. Yield Tests: Perform yield tests in accordance with ASTM C138, twice per day on concrete, and whenever materials or mix proportions are changed.
      e. Surface Tests: After curing, test the surface of the pavement with a straightedge or device which will reveal any irregularities in the concrete surface. Correct the surface or any portion of the pavement in a longitudinal direction which shows irregularities greater than one-eighth inch in 10 feet, or in a transverse direction irregularities greater than 1/4 inch in 10 feet.

   4. Test for Flexural Strength: During the progress of the work verify the flexural strength by testing beams made from concrete taken from the forms at intervals indicated herein. Mold and cure beams in accordance with ASTM C 31. Perform tests in accordance with ASTM C 78.
      a. Airfield Pavements: Mold one group of six beams for each 1000 cubic yards or fraction thereof. Select one set of 2 beams taken at three locations: near the beginning, at midway, and near the end of concrete placement for a total of six beams for each group. An approved laboratory shall furnish all

necessary labor facilities for molding, handling, and storing the beams at the site of the work and testing the beams. Perform tests at 7 days and 28 days.

b. All Other Pavements: Mold one set of four (4) beams for each 300 cubic yards or fraction thereof. An approved laboratory shall furnish all necessary facilities for molding, handling, and storing the beams at the site of the work and testing the beams. Perform tests at 7, 14, and 28 days.

5. Flexural Strength: Concrete shall meet the following requirements:
   a. 7-day Tests: If the ratio of the 7 day strength to the specified 28-day strength is less than 65 percent or if the concrete strength does not meet other requirements of this specification, the Contractor shall make all necessary adjustments for conformations.
6. Control Charts: Provide control charts for concrete flexural strength in accordance with ACI 214, Appendix, except as otherwise modified herein. Post copies of charts at the job site. Submit weekly copies to Contracting Officer. The charts shall indicate the specified strength and the average strength determined by the mix design. Each control chart shall consist of the following plots:
   a. Test Results: At the same location, plot each individual test strength (Airfield Pavement - the average result of three beams tested at 7 days and the average results of three beams tested at 28 days); the lowest acceptable value of individual beams tested at 28 days shall be 650 psi.
   b. Moving Average for Strength: Moving average of five consecutive tests (ACI 214). c. Moving Average for Range: The moving range is the difference between the highest and lowest of three test results: Points 1, 2 & 3; 2, 3 & 4; 3, 4 & 5; 4, 5 & 6; 5, 6 & 7; etc. Plot the moving average and compare the TABLE 1, the selected average strength. If the range of test results falls below the selected average range, the Contractor shall make necessary adjustments to the mix design to control the variation in the average strength results in order to assure that the specified strength is obtained.
7. Airfield Pavement samples for strength tests shall be taken at random from each group of beams molded. All beams shall be numbered consecutively, marked as 7-day and 28-day pairs, and identified as to each group sample.

END OF SECTION

SECTION 02587 PAVEMENT MARKINGS FOR ROADS AND PARKING LOTS

PART 1 - GENERAL

1.01 RERLATED SPECIFICATION SECTIONS:
A. Section 01000 - GENERAL REQUIREMENTS

1.02 SUMMARY
A. This section includes the painting of pavement surfaces for roads, paths, and parking lots. Paint may include reflective beads as specified herein.

1.03 REFERENCES
A. As specified herein:

1.	FED	Federal Specifications and Standards
2.	MIL	Military Specifications and Standards
3.	FDOT	State of Florida Department of Transportation

1.04 SUBMITTALS
A. Manufacturer's Certificates of Compliance: Submit for approval copies of manufacturer's certificates attesting that materials and equipment meet the requirements specified

B. Certified Test Reports: Submit for approval four certified copies of the reports of tests as required in referenced publications and Quality Control Section.

1.05 DELIVERY AND STORAGE
A. Deliver paints and paint materials in original sealed containers that plainly show the designated name, specification number, batch number, color, date of manufacturer, manufacturer's directions, and name of manufacturer. Provide storage facilities at the jobsite for maintaining materials at temperatures recommended by the manufacturer.

1.06 WEATHER LIMITATIONS
A. Apply paint to clean, dry surfaces, and unless otherwise approved, only when air and pavement temperatures are above 40 degrees F and less than 95 degrees F. Maintain paint temperature within these same limits. Do not apply paint when wind velocity exceeds 15 miles per hour.

1.07 TRAFFIC CONTROLS
A. Place suitable warning signs near the beginning of the work site and well ahead of the work site for alerting approaching traffic from both directions. Place small markers along newly painted lines to control traffic and prevent damage to newly painted surfaces. Mark painting equipment with large warning signs indicating slow-moving painting equipment in operation.

PART 2 - PRODUCTS

2.01 MATERIALS
A. Provide materials conforming to the requirements specified herein.
1. Paints for Roads: TT-P-1952C, color as indicated.
2. Retro-reflective Media: Fed. Spec. TT-B-1325, Type I, Gradation A.
3. FDOT Specifications

2.02 EQUIPMENT
A. Machines, tools, and equipment used in the performance of the work shall be approved by the Contracting Officer and maintained in satisfactory operating condition.

B. Paint Applicator: Provide self-propelled or mobile-drawn pneumatic spraying machine with suitable arrangements of atomizing nozzles and controls to obtain the specified results. Provide machine having a speed during application not less than 5 m.p.h., and capable of applying the stripe widths indicated, at the paint coverage rate specified herein and of even uniform thickness with clear-cut edges. The equipment for applying the paint for airfield pavements will be a self-propelled or mobile-drawn pneumatic spraying machine with an arrangement of atomizing nozzles capable of applying a width line at any one time in multiples of 6

inches, from 6 inches to 36 inches. Provide paint applicator with paint reservoirs or tanks of sufficient capacity and suitable gages to apply paint in accordance with requirements specified. Equip tanks with suitable air-driven mechanical agitators. Equip spray mechanism with quick-action valves conveniently located, and include necessary pressure regulators and gages in full view and reach of the operator. Install paint strainers in paint supply lines to insure freedom from residue and foreign matter that may cause malfunction of the spray guns. The paint applicator shall be readily adaptable for attachment of an air-actuated dispenser for the reflective media approved for use. Provide pneumatic spray guns for hand application of paint in areas where the mobile paint applicator cannot be used.

C. Reflective Media Dispenser: Attach dispenser for applying the retro-reflective media to the paint dispenser and operate automatically and simultaneously with the paint applicator through the same control mechanism. Use dispenser capable of adjustment and designed to provide uniform flow of reflective media over the full width of the stripe at the rate of coverage specified herein at all operating speed of the paint applicator to which it is attached.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION

A. Allow pavement surfaces to cure for a period of not less than 21 days before application of marking materials. Thoroughly clean surfaces to be marked before application of the paint. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods as required. Completely remove surface laitance, existing paint markings, and other coatings adhering to the pavement by water blasting. Do not commence painting in any area until pavement surfaces are dry and clean and have been inspected and approved by the Contracting Officer.

3.02 APPLICATION

A. Rate of Application:
   1. Paint: Apply paint evenly to the pavement area to be coated at a rate of 105 (plus or minus 5) square feet per gallon.
   2. Retro-reflective Markings: Apply glass spheres uniformly to the wet paint on pavement requiring reflective paint at a rate of 5 (plus or minus 0.5) pounds of glass spheres per gallon of paint.

B. Painting: Apply paint pneumatically with approved equipment at rate of coverage specified herein. Provide guidelines and templates as necessary to control paint application. Take special precautions in marking numbers, letters, and symbols. Sharply outline all edges of markings. The maximum drying time requirements of the paint specifications will be strictly enforced, to prevent undue softening of bitumen, and pickup, displacement, or discoloration by tires of traffic. Discontinue painting operations if there is a deficiency in drying of the markings until cause of the slow drying is determined and corrected.

C. Retro-reflective Media: Follow application of reflective media immediately after application of paint. Accomplish drop-on application glass spheres to insure even distribution at the specified rate of coverage. Discontinue operations should there be malfunction of either paint applicator or reflective media dispenser immediately until deficiency is corrected.

3.03 FIELD TESTING AND INSPECTION

A. Sampling and Testing: As soon as the paint and retro-reflective materials are available for sampling, obtain by random selection from the sealed containers, one quart sample of each batch in the presence of the Contracting Officer. Accomplish adequate mixing prior to sampling to insure a uniform, representative sample. A batch is defined as that quantity of material processed by the manufacturer at one time and identified by number on the label. Clearly identify samples by designated name, specification number, batch number, project contract number, intended use, and quantity involved. At the discretion of the Contracting Officer, samples provided may be tested by the Government for verification.

B. Inspection:
   1. Examine material at the job site to determine that it is the material referenced in the report of test results or certificate of compliance.
   2. Surface preparations and application procedures will be examined by the Contracting Officer to determine conformance with the requirements specified. Approve each separate operation prior to initiation of subsequent operations.

3. If the project inspector determines that the markings have not dried sufficiently in 90 minutes (during daylight operations) to prevent displacement, the work shall be discontinued until the cause of slow drying is determined and corrected.
4. Areas found to be deficient in accordance with this specification by the contracting officer shall be cleaned and repainted at no additional cost to the government prior to completion of this portion of the contract.

END OF SECTION

SECTION 02587 PAVEMENT MARKINGS FOR ROADS AND PARKING LOTS

PART 1 - GENERAL

1.01 RERLATED SPECIFICATION SECTIONS:
A. Section 01000 - GENERAL REQUIREMENTS

1.02 SUMMARY
A. This section includes the painting of pavement surfaces for roads, paths, and parking lots. Paint may include reflective beads as specified herein.

1.03 REFERENCES
A. As specified herein:

1. FED	Federal Specifications and Standards
2. MIL	Military Specifications and Standards
3. FDOT	State of Florida Department of Transportation

1.04 SUBMITTALS
A. Manufacturer's Certificates of Compliance: Submit for approval copies of manufacturer's certificates attesting that materials and equipment meet the requirements specified

B. Certified Test Reports: Submit for approval four certified copies of the reports of tests as required in referenced publications and Quality Control Section.

1.05 DELIVERY AND STORAGE
A. Deliver paints and paint materials in original sealed containers that plainly show the designated name, specification number, batch number, color, date of manufacturer, manufacturer's directions, and name of manufacturer. Provide storage facilities at the jobsite for maintaining materials at temperatures recommended by the manufacturer.

1.06 WEATHER LIMITATIONS
A. Apply paint to clean, dry surfaces, and unless otherwise approved, only when air and pavement temperatures are above 40 degrees F and less than 95 degrees F. Maintain paint temperature within these same limits. Do not apply paint when wind velocity exceeds 15 miles per hour.

1.07 TRAFFIC CONTROLS
A. Place suitable warning signs near the beginning of the work site and well ahead of the work site for alerting approaching traffic from both directions. Place small markers along newly painted lines to control traffic and prevent damage to newly painted surfaces. Mark painting equipment with large warning signs indicating slow-moving painting equipment in operation.

PART 2 - PRODUCTS

2.01 MATERIALS
A. Provide materials conforming to the requirements specified herein.
1. Paints for Roads: TT-P-1952C, color as indicated.
2. Retro-reflective Media: Fed. Spec. TT-B-1325, Type I, Gradation A.
3. FDOT Specifications

2.02 EQUIPMENT
A. Machines, tools, and equipment used in the performance of the work shall be approved by the Contracting Officer and maintained in satisfactory operating condition.

B. Paint Applicator: Provide self-propelled or mobile-drawn pneumatic spraying machine with suitable arrangements of atomizing nozzles and controls to obtain the specified results. Provide machine having a speed during application not less than 5 m.p.h., and capable of applying the stripe widths indicated, at the paint coverage rate specified herein and of even uniform thickness with clear-cut edges. The equipment for applying the paint for airfield pavements will be a self-propelled or mobile-drawn pneumatic spraying machine with an arrangement of atomizing nozzles capable of applying a width line at any one time in multiples of 6

inches, from 6 inches to 36 inches. Provide paint applicator with paint reservoirs or tanks of sufficient capacity and suitable gages to apply paint in accordance with requirements specified. Equip tanks with suitable air-driven mechanical agitators. Equip spray mechanism with quick-action valves conveniently located, and include necessary pressure regulators and gages in full view and reach of the operator. Install paint strainers in paint supply lines to insure freedom from residue and foreign matter that may cause malfunction of the spray guns. The paint applicator shall be readily adaptable for attachment of an air-actuated dispenser for the reflective media approved for use. Provide pneumatic spray guns for hand application of paint in areas where the mobile paint applicator cannot be used.

C. Reflective Media Dispenser: Attach dispenser for applying the retro-reflective media to the paint dispenser and operate automatically and simultaneously with the paint applicator through the same control mechanism. Use dispenser capable of adjustment and designed to provide uniform flow of reflective media over the full width of the stripe at the rate of coverage specified herein at all operating speed of the paint applicator to which it is attached.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION

A. Allow pavement surfaces to cure for a period of not less than 21 days before application of marking materials. Thoroughly clean surfaces to be marked before application of the paint. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods as required. Completely remove surface laitance, existing paint markings, and other coatings adhering to the pavement by water blasting. Do not commence painting in any area until pavement surfaces are dry and clean and have been inspected and approved by the Contracting Officer.

3.02 APPLICATION

A. Rate of Application:
   1. Paint: Apply paint evenly to the pavement area to be coated at a rate of 105 (plus or minus 5) square feet per gallon.
   2. Retro-reflective Markings: Apply glass spheres uniformly to the wet paint on pavement requiring reflective paint at a rate of 5 (plus or minus 0.5) pounds of glass spheres per gallon of paint.

B. Painting: Apply paint pneumatically with approved equipment at rate of coverage specified herein. Provide guidelines and templates as necessary to control paint application. Take special precautions in marking numbers, letters, and symbols. Sharply outline all edges of markings. The maximum drying time requirements of the paint specifications will be strictly enforced, to prevent undue softening of bitumen, and pickup, displacement, or discoloration by tires of traffic. Discontinue painting operations if there is a deficiency in drying of the markings until cause of the slow drying is determined and corrected.

C. Retro-reflective Media: Follow application of reflective media immediately after application of paint. Accomplish drop-on application glass spheres to insure even distribution at the specified rate of coverage. Discontinue operations should there be malfunction of either paint applicator or reflective media dispenser immediately until deficiency is corrected.

3.03 FIELD TESTING AND INSPECTION

A. Sampling and Testing: As soon as the paint and retro-reflective materials are available for sampling, obtain by random selection from the sealed containers, one quart sample of each batch in the presence of the Contracting Officer. Accomplish adequate mixing prior to sampling to insure a uniform, representative sample. A batch is defined as that quantity of material processed by the manufacturer at one time and identified by number on the label. Clearly identify samples by designated name, specification number, batch number, project contract number, intended use, and quantity involved. At the discretion of the Contracting Officer, samples provided may be tested by the Government for verification.

B. Inspection:
   1. Examine material at the job site to determine that it is the material referenced in the report of test results or certificate of compliance.
   2. Surface preparations and application procedures will be examined by the Contracting Officer to determine conformance with the requirements specified. Approve each separate operation prior to initiation of subsequent operations.

3. If the project inspector determines that the markings have not dried sufficiently in 90 minutes (during daylight operations) to prevent displacement, the work shall be discontinued until the cause of slow drying is determined and corrected.
4. Areas found to be deficient in accordance with this specification by the contracting officer shall be cleaned and repainted at no additional cost to the government prior to completion of this portion of the contract.

END OF SECTION

SECTION 02667: SITE WATER LINES

PART 1 GENERAL

1.01 RELATED SPECIFICATION SECTIONS:

A. Section 01000 - GENERAL REQUIREMENTS

1.02 REFERENCES

A. ASME/ANSI B16.26 - (1988) Cast Copper Alloy Fittings for Flared Copper Tubes

B. ASTM A 139 -

C. ASTM B 62 - (1993) Composition Bronze or Ounce Metal Castings

D. ASTM C 94 - (1996) Ready-Mixed Concrete

E. ASTM D 1785 - (1996; Rev. A) PolyVinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120

F. ASTM D 2241 - (1996; Rev. A) PolyVinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series)

G. ASTM D 2466 - (1996; Rev. A) PolyVinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40

H. ASTM D 2564 - (1996; Rev. A) Solvent Cements for PolyVinyl Chloride (PVC) Plastic Piping Systems

I. ASTM D 3139 - (1996; Rev. A) Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals

J. ASTM D 3261 – Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.

K. ASTM F 714 – Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.

L. ASTM F 402 - (1993) Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings

M. ASTM F 477 - (1996; Rev. A) Elastomeric Seals (Gaskets) for Joining Plastic Pipe

N. AWWA C104/A21.4 - (1995) Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water

O. AWWA C110/A21.10 - (1993) Ductile-Iron and Gray-Iron Fittings, 3 in. Through 48 in. (75 mm Through 1200 mm), for Water and Other Liquids

P. AWWA C111/A21.11 - (1995) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

Q. AWWA C153/A21.53 - (1994) Ductile-Iron Compact Fittings, 3 in. through 24 in. (76 mm through 610 mm) and 54 in. Through 64 in. (1,000 mm Through 1,600 mm), for Water Service

R. AWWA C500 - (1993; Addendum 1995) Metal-Seated Gate Valves for Water Supply Service

S. AWWA C502 - (1994) Dry-Barrel Fire Hydrants

T. AWWA C503 - (1988) Wet-Barrel Fire Hydrants

U. AWWA C509 - (1994) Resilient-Seated Gate Valves for Water and Sewerage Systems

V. AWWA C600 - (1993) Installation of Ductile-Iron Water Mains and Their Appurtenances

W. AWWA C605 - (1994) Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water

X. AWWA C651 - (1999) Disinfecting Water Mains

Y. AWWA C800 - (1989) Underground Service Line Valves and Fittings

Z. AWWA C900 - (1989; Addendum 1992) Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. Through 12 in., for Water Distribution

AA. AWWA C901

BB. AWWA M23 - (1980) PVC Pipe - Design and Installation

CC. MIL-HDBK 1008C -

DD. UBPPA UNI-B-8 - (1986) Direct Tapping of Polyvinyl Chloride (PVC) Pressure Water Pipe

EE. UL 246 - (1993; R 1997) Hydrants for Fire-Protection Service

FF. UL 262 - (1994; R 1997) Gate Valves for Fire-Protection Service

1.03 WATER DISTRIBUTION MAINS

A. Provide water distribution mains indicated of AWWA C900 polyvinyl chloride (PVC) plastic pipe with detector wire. Provide water main accessories, gate valves as specified and where indicated.

1.04 WATER SERVICE LINES

A. Provide water service lines indicated from water distribution main to building service at a point approximately 5 feet from building or as otherwise indicated on drawings. Water service lines shall conform to Section 2.02A. Ductile iron pipe appurtenances, and valves as specified for water mains may also be used for service lines. Provide PVC water service line appurtenances as specified and where indicated.

1.05 SUBMITTALS FOR REVIEW

A. Submit the following in accordance with Section 01300, "Submittals."

1. Water distribution main piping, fittings, joints, valves, and coupling
2. Water service line piping, fittings, joints, valves, and coupling
3. Hydrants
4. Indicator posts
5. Corporation stops
6. Valve boxes
7. Submit manufacturer's standard drawings or catalog cuts, except submit both drawings and cuts for push-on joints. Include information concerning gaskets with submittal for joints and couplings.
8. Installation procedures for water piping
9. Pressure and leakage tests
10. Disinfection/bacteriological tests

1.06 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit the following in accordance with Section 01300, "Submittals."

1. Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations.
2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.07 CERTIFICATES

A. Water distribution main piping, fittings, joints, valves, and coupling

B. Water service line piping, fittings, joints, valves, and coupling

C. Fire hydrants

D. Certificates shall attest that tests set forth in each applicable referenced publication have been performed, whether specified in that publication to be mandatory or otherwise and that production control tests have been performed at the intervals or frequency specified in the publication. Other tests shall have been performed within 3 years of the date of submittal of certificates on the same type, class, grade, and size of material as is being provided for the project.

1.08 DELIVERY AND STORAGE

A. Deliver, store, protect and handle products to site under provisions of Section 01600. Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials on site in enclosures or under protective covering. Store plastic piping, jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes, fittings, valves and hydrants free of dirt and debris.

1.09 HANDLING

A. Handle pipes fittings, valves, hydrants, and other accessories in a manner to ensure delivery to the trench in sound undamaged condition. Take special care to avoid injury to coatings and linings on pipe and fittings; make satisfactory repairs if coatings or linings are damaged. Carry, do not drag pipe to the trench. Store plastic piping, jointing materials and rubber gaskets that are not to be installed immediately, under cover out of direct sunlight.

PART 2 PRODUCTS

2.01 WATER DISTRIBUTION MAIN MATERIALS

A. Piping Materials
   1. Polyvinyl Chloride (PVC) Plastic Piping
      a. Pipe and Fittings: Pipe, AWWA C900, shall be plain end or gasket bell end, Pressure Class 150 (DR 18) with cast-iron-pipe-equivalent OD. Molecular Oriented (MO) PVC pipe, AWWA C900, shall be plain end or gasket bell end, Pressure Class 150 with cast-iron-pipe-equivalent OD. Fittings shall be gray iron or ductile iron, AWWA C110/A21.10 or AWWA C153/A21.53, and have cement-mortar lining, AWWA C104/A21.4, standard thickness. Fittings with push-on joint ends shall conform to the same requirements as fittings with mechanical-joint ends, except that bell design shall be modified, as approved, for push-on joint suitable for use with PVC plastic pipe specified in this paragraph. Pipe color is to be blue or white.
      b. Joints and Jointing Material: Joints for pipe shall be push-on joints, ASTM D 3139. Joints between pipe and metal fittings, valves, and other accessories shall be compression-type joints/mechanical joints, ASTM D 3139 and AWWA A21.11. Provide each joint connection with an elastomeric gasket suitable for the bell or coupling with which it is to be used. Gaskets for push-on joints for pipe, ASTM F 477. Gaskets for compression-type joints/mechanical joints for joint connections between pipe and metal fittings, valves, and other accessories, AWWA A21.11, for mechanical joints. Mechanically coupled joints using a sleeve-type mechanical coupling, as specified in paragraph entitled "Sleeve-Type Mechanical Couplings," may be used as an optional jointing method in lieu of push-on joints on plain-end PVC plastic pipe, subject to the limitations specified for mechanically coupled joints using a sleeve-type mechanical coupling and to the use of internal stiffeners as specified for compression-type joints in ASTM D 3139.
   2. High Density Polyethylene (HDPE) Plastic Pipe
      a. ASTM F-714-Pipe Std.; ASTM D3261 – Fittings Std.; AWWA C-901; 3" – 8" SDR 11.0, 160 psi. HDPE inside diameter shall equal or exceed PVC inside diameter.

B. Valves, Hydrants, and Other Water Main Accessories
   1. Gate Valves on Buried Piping: AWWA C500, AWWA C509, or UL 262. Unless otherwise specified, valves conforming to: (1) AWWA C500 shall be nonrising stem type with double-disc gates and mechanical-joint ends, (2) AWWA C509 shall be nonrising stem type with mechanical-joint ends, and (3) UL 262 shall be inside-screw type with operating nut, double-disc or split-wedge type gate, designed for a hydraulic working pressure of 150 psi, and shall have mechanical-joint ends. Materials for UL 262 valves shall conform to the reference standards specified in AWWA C500. Valves shall open by counterclockwise rotation of the valve stem. Stuffing boxes shall have 0-ring stem seals. Stuffing boxes shall be bolted and constructed so as to permit easy removal of parts for repair. In lieu of mechanical-joint ends and push-on joint ends, valves may have special ends for connection to sleeve-type mechanical coupling. Valve ends and gaskets for connection to sleeve-type mechanical coupling shall conform to the applicable requirements specified for the coupling. Provide 6-inch size valves with gearing, AWWA C500. Valves shall be of one manufacturer.

C. Fire Hydrants
   1. Hydrant: AWWA C502, UL 246, dry barrel type, inside dimension of 6 inches (153 mm) minimum, with minimum 5 inches (125 mm) diameter valve seat opening; minimum net water area of barrel not less than 190 percent of valve opening; 6 inch (153 mm) bell or mechanical joint inlet connection with accessories, gland bolts, and gaskets. Hydrant outlets shall have 0.90 discharge coefficients.

2. Hydrant Extensions: Fabricate in multiples of 6 inches (150 mm) with rod and coupling to increase barrel length.

3. Hose and Streamer Connection: Match sizes with utility company, two hose nozzles, and one pumper nozzle. Install a Hydra Storz connection with Cap (Hydra Shield Mfg. Co.) in place of the 4-1/2" steamer connection.

4. Finish: Primer and two coats of enamel in color to be selected by base.

D. Casing (under roadways)
1. Casing under all paved roads shall meet, at a minimum, the following:
a. Wall Thickness: (Steel Casing) All casings shall be 0.188", ASTM A139, Grade B.
b. Steel casing shall be coated inside and out with approved primer plus one coat of asphaltum paint on outside.
c. All casing as a minimum shall extend 3 feet beyond the edge of roadway surfaces, as indicated on the Drawings.

E. Casing/Pipe Spacers
1. The Contractor shall provide casing spacers for all piping routed through steel casing. The spacers shall be stainless steel construction with UHMW polymer runners and shall be in two (2) halves. The nuts and bolts used shall be stainless steel. A total of no less than two (2) spacers per joint of pipe shall also be used plus one (1) near the openings (ends) of the casing. The spacers shall be Model CCS by Cascade Water Works Manufacturing Co., or equal.
2. The Contractor shall provide casing end seals on all casings. The end seals shall wrap around the casing and carrier pipes after installation to provide a barrier to backfill debris and seepage. Stainless steel bands shall be used to secure the end seals. The casing end seals shall be Model CCES by Cascade Waterworks Mfg. Company, Advance Products and Systems or equal.

2.02 WATER SERVICE LINE MATERIALS

A. Plastic Piping - Plastic pipe and fittings shall bear the seal of the National Sanitation Foundation for potable water service. Plastic pipe and fittings shall be supplied from the same manufacturer.
1. Polyvinyl Chloride (PVC) Plastic Piping: ASTM D 1785, Schedule 40; or ASTM D 2241, with SDR as necessary to provide 150 psi minimum pressure rating. Fittings, ASTM D 2466. Pipe and fittings shall be of the same PVC plastic material and shall be one of the following pipe/fitting combinations, as marked on the pipe and fitting, respectively: [PVC 1120/PVC I; PVC 1220/PVC 12;] PVC 2120/PVC II; PVC 2116/PVC II. Solvent cement for jointing, ASTM D 2564.

B. Insulating Joints - Joints between pipes of dissimilar metals shall have a rubber-gasketed or other suitable approved type of insulating joint or dielectric coupling, which will effectively prevent metal-to-metal contact between adjacent sections of piping.

C. Corporation Stops - Ground key type; bronze, ASTM B 61 or ASTM B 62; and suitable for the working pressure of the system. Ends shall be suitable for solder-joint or flared tube compression type joint. Threaded ends for inlet and outlet of corporation stops, AWWA C800; coupling nut for connection to flared copper tubing, ASME/ANSI B16.26.

D. Curb Boxes - Provide a curb box for each curb or service stop. Curb boxes shall be of cast iron of a size suitable for the stop on which it is to be used. Provide a round head. Cast the word "WATER" on the lid. Each box shall have a heavy coat of bituminous paint.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS FOR INSTALLATION OF PIPELINES

A. These requirements shall apply to all pipeline installation except where specific exception is made in the "Special Requirements..." paragraphs.

3.02 LOCATION OF WATER LINES

A. Terminate the work covered by this section at a point approximately 5 feet from the building, unless otherwise indicated. Do not lay water lines in the same trench with gas lines or electric wiring.
1. Water Piping Installation Parallel With Sewer Piping

a. Normal Conditions: Lay water piping at least 10 feet horizontally from a sewer or sewer manhole whenever possible. Measure the distance edge-to-edge.
b. Unusual Conditions: When local conditions prevent a horizontal separation of 10 feet, the water piping may be laid closer to a sewer or sewer manhole provided that:
(1) The bottom (invert) of the water piping shall be at least 18 inches above the top (crown) of the sewer piping.
(2) Where this vertical separation cannot be obtained, the sewer piping shall be constructed of AWWA-approved water pipe and pressure tested in place without leakage prior to backfilling.
(3) The sewer manhole shall be of watertight construction and tested in place.

2. Installation of Water Piping Crossing Sewer Piping
a. Normal Conditions: Water piping crossing above sewer piping shall be laid to provide a separation of at least 18 inches between the bottom of the water piping and the top of the sewer piping.
b. Unusual Conditions: When local conditions prevent a vertical separation described above, use the following construction:
(1) Sewer piping passing over or under water piping shall be constructed of AWWA-approved ductile iron water piping, pressure tested in place without leakage prior to backfilling.
(2) Water piping passing under sewer piping shall, in addition, be protected by providing a vertical separation of at least 18 inches between the bottom of the sewer piping and the top of the water piping; adequate structural support for the sewer piping to prevent excessive deflection of the joints and the settling on and breaking of the water piping; and that the length, minimum 20 feet, of the water piping be centered at the point of the crossing so that joints shall be equidistant and as far as possible from the sewer piping.

3. Sewer Piping or Sewer Manholes: No water piping shall pass through or come in contact with any part of a sewer manhole.

3.03 EARTHWORK

A. Perform earthwork operations in accordance with Section 02222, "Excavation," and Section 02225, "Trenching."

3.04 PIPE LAYING AND JOINTING

A. Remove fins and burrs from pipe and fittings. Before placing in position, clean pipe, fittings, valves, and accessories, and maintain in a clean condition. Provide proper facilities for lowering sections of pipe into trenches. Do not under any circumstances drop or dump pipe, fittings, valves, or any other water line material into trenches. Cut pipe accurately to length established at the site and work into place without springing or forcing. Replace by one of the proper length any pipe or fitting that does not allow sufficient space for proper installation of jointing material. Blocking or wedging between bells and spigots will not be permitted. Lay bell-and-spigot pipe with the bell end pointing in the direction of laying. Grade the pipeline in straight lines; avoid the formation of dips and low points. Support pipe at proper elevation and grade. Secure firm, uniform support. Wood support blocking will not be permitted. Lay pipe so that the full length of each section of pipe and each fitting will rest solidly on the pipe bedding; excavate recesses to accommodate bells, joints, and couplings. Provide anchors and supports where indicated and where necessary for fastening work into place. Make proper provision for expansion and contraction of pipelines. Keep trenches free of water until joints have been properly made. At the end of each workday, close open ends of pipe temporarily with wood blocks or bulkheads. Do not lay pipe when conditions of trench or weather prevent installation. Depth of cover over top of pipe shall not be less than 2 1/2 feet. Install access fittings to permit disinfection of water system.

3.05 CONNECTIONS TO EXISTING WATER LINES

A. Make connections to existing water lines after approval is obtained and with a minimum interruption of service on the existing line. Scheduling of any outage requires a minimum of one-week prior notice for the user of the facility. Make connections to existing lines under pressure in accordance with the recommended procedures of the manufacturer of the pipe being tapped.

3.06 SPECIAL REQUIREMENTS FOR INSTALLATION OF WATER MAINS

A. Installation of PVC Plastic Water Main Pipe and Associated Fittings: Unless otherwise specified, install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines"; with the requirements of AWWA C605 for laying of pipe, joining PVC pipe to fittings and accessories, and setting of hydrants, valves, and fittings; and with the recommendations for pipe joint assembly and appurtenance installation in AWWA M23, Chapter 7, "Installation."
1. Jointing: Make push-on joints with the elastomeric gaskets specified for this type joint, using either elastomeric-gasket bell-end pipe or elastomeric-gasket couplings. For pipe-to-pipe push-on joint connections, use only pipe with push-on joint ends having factory-made bevel; for push-on joint

connections to metal fittings, valves, and other accessories, cut spigot end of pipe off square and re-bevel pipe end to a bevel approximately the same as that on ductile-iron pipe used for the same type of joint. Use an approved lubricant recommended by the pipe manufacturer for push-on joints. Assemble push-on joints for pipe-to-pipe joint connections in accordance with the requirements of AWWA C605 for laying the pipe and the recommendations in AWWA M23, Chapter 7, "Installation," for pipe joint assembly. Make compression-type joints/mechanical joints with the gaskets, glands, bolts, nuts, and internal stiffeners previously specified for this type joint; assemble in accordance with the requirements of AWWA C605 for joining PVC pipe to fittings and accessories, with the applicable requirements of AWWA C600 for joint assembly, and with the recommendations of Appendix A to AWWA C111/A21.11. Cut off spigot end of pipe for compression-type joint/mechanical-joint connections and do not re-bevel. Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations of the coupling manufacturer using internal stiffeners as previously specified for compression-type joints.

2. Pipe Anchorage: Provide concrete thrust blocks. Thrust blocks shall be in accordance with the requirements of AWWA C605 for reaction or thrust blocking and plugging of dead ends, except that size and positioning of thrust blocks shall be as indicated. Use concrete, ASTM C 94, having a minimum compressive strength of 4,000 psi at 28 days.
3. Install a # 10 gage copper trace wire at top of and buried with PVC pipe to facilitate location with an electronic detector. Wrap around valve box and terminate 3-4" below grade. Do not wrap wire around pipe. Trace wire shall have bright blue insulation. Install magnetic detectable conductor 12 inches below finish grade. The magnetic detectable conductor shall also be bright blue.

B. Installation of Valves and Hydrants
1. Installation of Valves: Install gate valves on PVC water mains in accordance with the recommendations for appurtenance installation in AWWA M23, Chapter 7, "Installation." Make and assemble joints to gate valves as specified for making and assembling the same type joints between pipe and fittings.
2. Installation of Hydrants: Install hydrants in accordance with AWWA C600 for hydrant installation and as indicated. Make and assemble joints as specified for making and assembling the same type joints between pipe and fittings. Install hydrants with the 4 1/2 inch connections facing the adjacent paved surface. If there are two paved adjacent surfaces, contact the Contracting Officer for further instructions.

C. Installation of Water Service Piping
1. Location - Connect service piping to the building service 5 feet from the building line unless otherwise specified or indicated.
2. Service Line Connections to Water Mains - Connect service lines 2 inch size to the main with a rigid connection or a corporation stop and gooseneck and install a gate valve on service line below the frostline as indicated. Connect service lines to PVC plastic water mains in accordance with UBPPA UNI-B-8 and the recommendations of AWWA M23, Chapter 9, "Service Connections."

D. Special Requirements for Installation of Water Service Piping
1. Installation of Plastic Piping - Install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" and with the applicable requirements of ASTM D 2774 and ASTM D 2855, unless otherwise specified. Handle solvent cements used to join plastic piping in accordance with ASTM F 402.
   a. Jointing: Make solvent-cemented joints for PVC plastic piping using the solvent cement previously specified for this material; assemble joints in accordance with ASTM D 2855. Make solvent-cemented joints for ABS plastic piping using the solvent cement previously specified for this material; assemble joints in accordance with the recommendations of the pipe manufacturer, as approved. Make plastic pipe joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.
   b. Plastic Pipe Connections to Appurtenances: Connect plastic pipe service lines to corporation stops and gate valves in accordance with the recommendations of the plastic pipe manufacturer.

E. Disinfection - Disinfect new water piping and existing water piping affected by Contractor's operations in accordance with AWWA C651and as required by State permit. Prior to placing main in service contractor shall submit bacteriological results and pressure test results to the Government for the purpose of requesting State clearance. The Government will notify the contractor when the main has been approved and ready to be placed in service. Bacteriological samples shall be taken on two consecutive days at the connection to the existing system, the end point of the new addition, on each new line branching off main, and every 1,200 feet on straight runs of pipe. Contractor shall submit a drawing showing the sampling point locations and clearly indicate the chlorine residuals.
1. Prior to starting work, verify system is complete, flushed and clean.

2. Ensure PH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
3. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
4. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
5. Maintain disinfectant in system for 24 hours.
6. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
7. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
8. Take samples no sooner than 24 hours after flushing, from locations indicated above, and analyze in accordance with AWWA C651.

3.08 DIRECTIONAL DRILLING

A. Where indicated on the drawings, the Contractor shall use directional drilling (trenchless excavation). The directional drilling shall be done using experienced personnel as well as properly sized equipment rated for both the size and length of pipe to be installed. The equipment shall incorporate the use of a radio detection-locating device. The locating device shall be capable of determining the position of the drill head plus or minus two (2) inches.

B. The actual drilling process shall be one of displacement and compaction. The drill head shall cut its own hole and then compact the displaced material against the walls of the drilled hole. Bentonite shall be used to help hold the walls of the hole in place and ultimately fill the voids between the pipe and the walls of the hole.

C. The pipe to be installed in all directional drilling shall be high-density polyethylene, as detailed in Section 2.01.A.2 above. All piping shall be fitted with flanged fittings at both ends. The length shall be sufficient length to allow for at least a minimum of 5 feet below the bottom of the obstacle being drilled under.

D. All normal precautions shall be utilized to protect any existing utilities within the drilling area.

3.08 FIELD QUALITY CONTROL

A. Field Tests and Inspections - The Government will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests, and provide labor, equipment, and incidentals required for testing, except that water and electric power needed for field tests. The Contractor shall produce evidence, when required, that any item of work has been constructed in accordance with the drawings and specifications. Do not begin testing on any section of a pipeline where concrete thrust blocks have been provided until at least 5 days after placing of the concrete.

B. Testing Procedure - Test water mains and water service lines in accordance with the applicable specified standard, except for the special testing requirements given in paragraph entitled "Special Testing Requirements." Test PVC plastic water mains and water service lines made with PVC plastic water main pipe in accordance with the requirements of AWWA C605 for pressure and leakage tests. The amount of leakage on pipelines made of PVC plastic water main pipe shall not exceed the amounts given in AWWA 605, except that at joints made with sleeve-type mechanical couplings, no leakage will be allowed. Test water service lines in accordance with applicable requirements of AWWA C605 for hydrostatic testing. No leakage will be allowed at plastic pipe joints.

C. Special Testing Requirements - For pressure test, use a hydrostatic pressure 50 psi greater than the maximum working pressure of the system, except that for those portions of the system having pipe size larger than 2 inches in diameter, hydrostatic test pressure shall be not less than 200 psi. Hold this pressure for not less than 2 hours. Prior to the pressure test, fill that portion of the pipeline being tested with water for a soaking period of not less than 24 hours. For leakage test, use a hydrostatic pressure not less than the maximum working pressure of the system. Leakage test may be performed at the same time and at the same test pressure as the pressure test.

END OF SECTION

SECTION 02900 SEEDING

PART 1 GENERAL

1.01 RELATED SPECIFICATION SECTIONS:
A. Section 01000 – GENERAL REQUIREMENTS

1.02 WORK INCLUDED
A. Placing topsoil.

B. Fertilizing.

C. Seeding.

D. Maintenance.

1.03 REFERENCES
A. Federal Specifications:
1. JJJ-S-181B, SEP 64 Seed, Agricultural.

1.04 DEFINITIONS
A. Weeds: any non-specified plant.

1.05 SUBMITTALS
A. Certification of grass seed by a registered testing laboratory less than ten months prior to seeding.

B. Fertilizer sample and product data.

C. Topsoil sample.

D. Mulch sample and product data.

E. Soil Test by a certified soil laboratory for: pH, Potassium, Phosphorus, Calcium, Magnesium, N-P-K, and a nematode count.

1.06 DELIVERY AND STORAGE
A. All seed shall be labeled in accordance with U. S. Department of Agriculture Rules and Regulations under the Federal Seed Act. All seed shall be furnished in scaled standard containers. Seed that has become wet, moldy, or otherwise damaged in transit or in storage shall not be used.

B. Fertilizer shall be delivered to the site in the original, unopened bags, each bearing the manufacturer's guaranteed analysis. Any fertilizer that becomes caked or otherwise damaged, making it unsuitable for use, shall not be used. Seed, fertilizer and other grassing materials shall be stored under cover and protected from damage which would make them unacceptable for use.

PART 2 PRODUCTS

2.01 MATERIALS
A. Topsoil: If the quantity of existing topsoil is inadequate for planting, sufficient additional topsoil shall be furnished. Topsoil furnished shall be a natural, fertile, friable soil. It shall be obtained from naturally well-drained areas. Topsoil shall be without admixture of shell, rock, debris, clay, weeds, weed seed, and toxic substances. Topsoil to be Clean Yellow Fill, No. 4 to 200 sand, and pH 5.5 - 6.5.

B. Fertilizer: Gro-Tone Bed Mix.

C. Mulch: Oat, wheat straw, or hay, dry, and free from weeds or material detrimental to plant life.

2.02 GRASS SEED MATERIALS

A. Seed: Unless otherwise specified, use Centipede seed or a mix of Centipede seed and Annual Rye seed, depending on the season. Grass seed shall conform to Federal Specification JJJ-S-181 and shall satisfy the following requirements:
   1. Minimum Germination: 80%
   2. Maximum Hard Seed: 19%
   3. Maximum Weed Content: 1%

B. Seed failing to meet the purity or germination requirements by no more than twenty-five percent may be used, but the quantity shall be increase to yield the required rate of pure live seed. Seed failing to meet the weed seed requirements shall not be used.

PART 3 EXECUTION

3.01 ESTABLISHMENT OF TURF

A. Grading: Areas to be grassed shall be graded to remove depressions, undulations, and irregularities in the surface before grassing. Finish grading elevations shall be in accordance with the grading plan and subject to approval of the Contracting Officer.

B. Placing Topsoil: Areas to be grassed shall have a minimum topsoil cover of 4 inches. Topsoil shall not be placed when the sub-grade is excessively wet, extremely dry, or in a condition otherwise detrimental to the seed or to proper grading.

C. Applying Fertilizer: Rake in Fifty (50) Lbs. of Bed Mix per 1000 SF to a depth of 1/4" to 3/4".

D. Planting Seeds: Immediately before seeds are sown and after fertilizer is applied, the ground shall be scarified as necessary and shall be raked until the surface is smooth, friable, and of uniformly fine texture. Areas to be grassed shall be seeded evenly in a crossing pattern (two-ways min.) with a mechanical spreader, raked lightly to put seed at 1/4" to 1" deep, rolled with a 200-pound roller and watered with a fine spray. Seed shall be applied at the following rate:

Seed	LBS per 1000 SF
Centipede	One-Half (.5)
Annual Rye (mix in for winter)	Five (5)

E. Mulching: Mulching shall be done within 48 hours of seeding by applying one-half (1/2) inch of mulch over the seeded areas then lightly rolling a disc over the mulch to stabilize the soil.

F. Clean-up: All excess soil, materials, stones, and other waste shall be removed from the site daily and not allowed to accumulate. Paved areas shall be cleaned daily.

3.02 MAINTENANCE

A. Maintenance shall begin immediately following the last operation of grassing. Maintenance shall be for a period of sixty days and shall include watering, mowing, reseeding and/or replanting, control and removal of weeds and other grasses, and all other work necessary to produce a healthy and uniform stand of grass.

3.03 REQUEST FOR FINAL ACCEPTANCE

A. The Contractor shall submit to the Contracting Officer two copies of a written request for final acceptance of the seeding work. The request shall be submitted at least five days prior to the anticipated date of acceptance.

END OF SECTION

SECTION 02938 SODDING

PART 1 GENERAL

1.01 RELATED SPECIFICATION SECTIONS:
A. Section 01000 – GENERAL REQUIREMENTS

1.02 DESCRIPTION OF WORK
A. Extent of landscape work generally includes:
1. Weed Treatment
2. Soil Preparation
3. Sodding
4. Reconditioning Existing Turf Areas
5. Cleanup and Protection
6. Maintenance

B. Sub-grade Elevations: Excavation, filling and grading required to establish elevations shown on drawings are not specified in this section. Refer to Earthwork sections. Subcontractors shall coordinate with contractor on responsibility for earthwork.

1.03 REFERENCES
A. General: Planting materials shall meet or exceed the Specifications of Federal, State and local laws requiring inspection for plant disease and insect control.

B. Sod shall conform to the following document that is to be considered part of these Specifications: "Guideline Specifications to Sodding" American Sod Producers Association. (ASPA)

1.04 QUALIFICATIONS
A. The contractor shall have not less than 3 years experience installing sod.

1.05 SUBMITTALS AND INSPECTIONS
A. Inspections: All necessary state, federal, and other inspection certificates shall accompany the invoice for each shipment or order for sod materials as approval at the site or elsewhere

B. Analysis and Standards: Pack standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agricultural Chemists, wherever applicable.

C. Provide the following samples prior to installation:
1. Herbicide: Label from container or supplier's brochure.
2. Fill Sand: One-ounce sample of sand.
3. Soil Amendments: Labels from all bags.
4. Sod: Submit sod grower's certification of grass species. Identify source location.
5. Soil Test: Contractor will have existing soil tested by an approved soil laboratory. Results of test shall be forwarded to the Contracting Officer in accordance with Section 01410 of the specifications. The samples tested shall consist of a representative mixture from the site. Cost of the soil test and all additives at rates recommended by the laboratory shall be included in the base bid. Soil Test shall include these items and amendment rates of each needed for the specified sod: pH factor, Potassium, Phosphorus, Calcium, Magnesium, N-P-K, and a nematode count.

1.06 JOB CONDITIONS
A. Basic Regulations: Sodding operations shall be conducted under favorable weather conditions during the seasons, which are normal for such work as determined by acceptable practice in the locality. Contractor is hereby notified of active utilities and caution shall be exercised to avoid interruption of services. Contractor is responsible for replacement of any existing buried utilities, irrigation lines, etc., if they are broken during the planting operations. Contractor shall obtain a digging permit and contact the appropriate utility to have their location marked. If not, any damage to utilities will be repaired at the contractor's expense. Contractor shall protect existing paved areas, curb/gutters, walks, etc. The contractor will repair any damage.

B. When conditions detrimental to sod growth are encountered during soil preparation or planting, such as rubble fill, adverse drainage conditions, or obstructions, notify Contracting Officer and correct before planting.

C. Sequence of Work: Sod after irrigation and final grades are established unless otherwise acceptable to Contracting Officer. Protect existing lawn areas and promptly repair damage to lawns resulting from operations.

1.07 WARRANTY & REPLACEMENT

A. Contractor shall guarantee that at the end of 60 days following final building acceptance, all sod areas shall have established grass that is uniform in color and quality, and is reasonably free from visible imperfections. Any sod areas not in this condition will be replaced at no expense to the government. Inspection to determine the condition of the sod areas will be made by the Contracting Officer upon receiving such a request from contractor.

B. Contractor shall not be held responsible for damages to sod areas due to government neglect, hurricanes, tornadoes, or for damage caused by theft or vandalism, other contractor's work on the site, application of fertilizers, and pesticides or other materials not applied by him. **The cost to repair damage caused by another contractor shall be paid for by the contractor responsible for the damage. This contractor shall immediately notify the prime contractor of the damage, etc.**

C. Repair: When any portion of the surface becomes gullied or otherwise damaged due to drainage conditions, the affected portion shall be repaired to reestablish condition and grade of soil to as it was prior to injury as directed. Repair work required shall be performed without cost to the government. Repair shall be made within 10 days or as soon as weather conditions are satisfactory for planting.

PART 2 PRODUCTS

2.01 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

B. Deliver sod on pallets after preparations for sodding have been completed and lay immediately. Protect sod from drying out. Use all means necessary to protect sod materials before, during and after installation and to protect the installed work and materials of all other trades.

C. **Do not deliver more sod than can be laid in 24 hours. Sod not laid within 24 hours of delivery will be rejected.**

2.02 SOD

A. Sod Schedules: Contractor shall furnish the sod required to accomplish the work and leave no bare areas.
   1. General lawn use at buildings: Centipede, Eremochloa ophiuroides.
   2. Large areas, airfield. etc.: Common Bermudagrass, Cynodon dactylon.
   3. Playing fields; baseball, soccer, football, etc.: "Tifway" Bermuda, Cynodon dactylon.
   4. General lawn use Soundside area: Floratam St. Augustine, Stenotaphrum secundatum.

B. Provide strongly rooted sod of the type indicated on the drawings, ASPA approved field grown grade. All sod shall be nursery grown under climatic conditions similar to those in the locality of the project for a minimum of two (2) years and machine cut and harvested to pad thickness of 3/4" to 1 1/4", excluding top growth and thatch. Provide only sod capable of vigorous growth and development when planted with maximum five percent (5%) deviation in either length, width, or pad thickness. Broken pads or pads with uneven ends will not be acceptable.

C. Sod shall have root development, which will support its own weight, without tearing, when suspended vertically by its two upper corners.

D. Sod shall be clear of non-specified grasses and weeds with not more than 3 weeds per pallet (500 SF).

E. Contracting Officer reserves the right to inspect grass areas from time of installation to Final Acceptance. The time of inspection shall be after the grass has gone not mowed for a minimum of two weeks. Any

evidence of non-specified grasses or weeds will be cause for rejection and replacement of the unacceptable lawn areas.

2.03 SOIL AMENDMENT

A. Fill Sand: Clean yellow fill, No. 4 to 200 Sand, pH 5.5 - 6.5.

B. Soil Amendment for All Sod (See 3.04 A for ratios):
   1. Gro-Tone Bed Mix.
   2. Black Kow Cow manure.

2.04 MISCELLANEOUS LANDSCAPE MATERIALS

A. Water: Furnished by government or provided by the project irrigation system. Contractor shall provide hose and other watering equipment.

B. Edging (if indicated on the drawings): Black Aluminum, 1/8" x 4" with stakes. Curve-Rite Aluminum Edging (800) 366-2878, Sure-Loc (800) 787-3562, PermaLoc (800) 356-9660 or approved equal.

C. Mulch: Longleaf Pine Straw. Freshly baled, dry, and free of debris, leaves, insects, and briars.

D. Wood Pegs: Softwood, sufficient size and length to ensure anchorage of sod on slopes.

E. Herbicide (For Pre-Sod Treatment of Weeds, Etc.): Round-Up by Monsanto or approved equal.

F. Herbicide (During Maintenance Period): Submit Label / Manufacturer's instructions.

G. Fertilizer (for maintenance period): Gro-Tone Lawn Special 16-4-8 or approved equal. For winter applications use approved winterizer.

PART 3 EXECUTION

3.01 WEED TREATMENT

A. All site locations disturbed by site construction and to receive sod where weeds exist shall receive an initial treatment of post-emergent herbicide. Planting areas shall not be disturbed for fourteen (14) days following each application of herbicide. This treatment shall be repeated as required so that no weeds are present at the date of final inspection of the Project and at the conclusion of the 60-day maintenance period.

B. Post-emergent weed treatment includes removal of weeds and other undesirable ground cover vegetation and shall be accomplished a minimum of fourteen (14) days prior to soil preparation for sodding operations.

C. Care shall be taken not to affect existing trees or shrubs to be saved on the site. Also care will be taken not to affect plants on adjacent site.

3.02 WEED TREATMENT PROCEDURE

A. Mow grass and/or existing weeds in designated areas to 3" height.

B. Spray herbicide on a day that is not rainy or windy or below 65 degrees F.

C. Do not disturb soil for 14 days.

D. After 14 days, mechanically rake soil when the soil is not excessively hard or dry (water the soil if necessary).

E. Remaining dead material shall be allowed to accumulate in place and shall be incorporated into the soil through the roto-tilling of the soil preparation work.

3.03 SOIL PREPARATION AND BED LAYOUT

A. Contractor shall report immediately upon his awareness, any site condition or situation of the contiguous landscape that would cause flooding, washing or concentration of excess surface water to the areas receiving planting or lawn.

B. Prior to placement of any required fill sand, cultivate sub-grade to a minimum of four inches (4"). Remove stones over one-half inch diameter (1/2") and sticks, roots, rubbish and other extraneous debris of any dimension.

C. Fill sand is to be placed to obtain uniform site grade and proper drainage. Compact to a minimum standard density of 80%.

D. Prior to fine grading install Edging and Stakes per manufacturer's instructions. Layout of Edging is as indicated on the drawings. Straight runs are to be straight to within 1/2" and arcs are to be round to within 1/2" of plan dimensions. All Edging shall be truly square to other Edging or Sidewalks, etc. where shown.

E. Irrigation work, if included, shall be completed after roto-tilling and compaction, but prior to fine grading.

F. Fine Grading: The entire area shall be raked smooth after removing all rocks, roots and debris one-half inch (1/2") in diameter or larger. Make changes to grade gradual and blend slopes into level areas. The site shall be free from irregular surface changes and shall vary uniformly between fixed elevations.

G. Fine grade grass areas to smooth, even surface with loose, uniformly fine texture. Roll, rake and drag lawn areas, remove ridges and fill depressions, as required to meet finish grade. Limit fine grading to areas which can be planted immediately after grading.

H. Allow for grass thickness in areas to be sodded and mulch thickness in shrub beds. Finish grade of soil shall be two inches (2") below top of pavement in all areas.

3.04 SOIL MIXTURE

A. Mix specified soil amendment (see Section 2.01 A) by roto-tilling to a depth of four (4) inches:
   1. Fifty (50) LBS of Bed Mix per One Thousand (1000) SF of Sod.
   2. One Hundred (100) LBS of Cow Manure per One Thousand (1000) SF of Sod.

B. Before mixing, clean topsoil of roots, plants, sod, stones, lumps, existing irrigation materials, and other extraneous materials harmful or toxic to sod growth. (maximum acceptable lump size is 1/2".)

C. Contractor may be required to mix all ingredients of the planting soil mix in the presence of the project inspector. All ingredients shall be thoroughly blended to provide a homogeneous mixture.

3.05 PREPARATION OF SOD AREAS

A. Bed preparation shall be done by hand within the drip-line of existing trees to protect the tree's roots.

B. Planting beds with weed growth shall be treated as necessary to remove weeds and re-inspected. No beds shall be accepted with weeds or unspecified grass.

3.06 SODDING NEW LAWNS

A. Soil shall be prepared prior to sodding. See Sections 3.01 - 3.05.

B. Lay sod within 24 hours from time of stripping. Do not plant dormant sod or if ground is frozen. Do not use any piece of sod less than .5 SF (one-half square foot). Do not harvest or transport sod when moisture content may adversely affect sod survival. Protect sod from sun, wind, and dehydration prior to installation. Do not tear, stretch, or drop sod during handling and installation.

C. Prior to placement of sod, water soil thoroughly to obtain at least 6" (six) inches penetration into the soil below the sod. Do not lay sod on dry or frozen ground.

D. Lay sod to form a solid mass with **tightly** fitted joints. Tightly butt ends and sides of sod strips; do not overlap. **Stagger** strips to offset joints in adjacent courses. Continuously rake soil in area of installation to assure a smooth finish grade. Tamp or roll lightly to ensure contact with sub-grade. **Work** sifted soil into minor cracks between pieces of sod; remove excess to avoid smothering of adjacent grass.

E. Neatly and cleanly edge sod with a sharpened instrument so as not to fray edges of sod. Continuously re-sharpen during edging process.

F. Sod indicated areas within contract limits and areas adjoining contract limits disturbed as a result of construction operations.

G. On slopes of 3:1 and steeper, lay sod perpendicular to slope and secure every row with wooden pegs at a maximum of two (2) feet on center. Drive pegs flush with top of sod pad.

H. Firmly press sod into contact with soil with roller weighing 100-150 pounds per lineal foot.

I. Water sod thoroughly with a fine spray immediately after planting to obtain at least six inches (6") penetration into the soil below the sod.

3.07 RECONDITIONING EXISTING TURF AREAS

A. Provide soil amendments, sod, fill sand and all other materials necessary to return turf to its original condition before the start of the contract.

B. Recondition existing turf areas damaged by contractor's operations including storage for materials and equipment and movement of vehicles. Re-grade as required. Fill low spots and meet new finish grades. Cultivate bare and compacted areas thoroughly to provide a suitable soil for sod.

C. Water newly reconditioned turf areas as required to establish turf. (60 Days Minimum).

3.08 MULCHING

A. Dress Mulching: Within two days after planting not less than three inches (3") of mulch shall be placed on entire area of planting beds, and not less than four inches (4") over shrub and tree pits.

B. Edge mulch with a round-point shovel where beds are next to turf or walkways so that mulch is pushed into soil and is kept in beds.

3.09 MAINTENANCE

A. Begin maintenance immediately after planting and continue until sixty (60) days after final acceptance of the project, or longer as required to establish the turf.

B. Maintain newly sodded lawn areas by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, re-grading and replanting as required to establish a smooth, acceptable lawn, free of eroded or bare areas. Immediately replace sod in areas showing deterioration.

C. Apply herbicides and insecticides that will not inhibit growth but will prevent weed and insect damage to turf. Comply with State of Florida and manufacturer's requirements for application of herbicides and insecticides.

D. After sod is rooted, apply Fertilizer at the rate of Ten (10) Lbs. per 1000 SF. If winter apply the approved winterizer at the medium rate listed on the bag.

E. Watering Schedule: Watering schedule is to include the duration and frequency each irrigation zone will run per week; or, if there is no irrigation system the schedule of the watering truck or hand watering. This will be worked out jointly with the irrigation contractor and shall be programmed on to the controller after review by BCE. Program shall be submitted to Contracting Officer as part of the final acceptance process.

3.10 CLEANUP AND PROTECTION

A. During landscape work, all pallets, sod pieces, debris, and sand on pavement, shall be removed daily.

B. Any excess excavated subsoil or topsoil shall be removed from the site.

C. After sodding operations are finished, all paved areas which may have become strewn with soil or other material shall be thoroughly cleaned by sweeping, and if necessary, power washing.

D. Protect landscape work and materials from damage due to landscape operations, operations by other contractors and trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

3.11 INSPECTION AND ACCEPTANCE

A. The completed sod will be inspected at the time of the final inspection. Sod will also be inspected at the end of the 60-day maintenance period.

B. Where inspected landscape work does not comply with requirements, replace rejected work and continue specified maintenance until re-inspected and found to be acceptable. Remove rejected and materials promptly from the project site.

END OF SECTION

SECTION 02950 LANDSCAPE PLANTING

PART 1 GENERAL

1.01 RELATED SPECIFICATION SECTIONS:
A. Section 01000 – GENERAL REQUIREMENTS

1.02 DESCRIPTION OF WORK
A. The work consists of installing a complete landscape planting as shown on the drawings and as specified, including the furnishing of all labor, equipment, supplies, transportation, materials, operations and adjustments in connection with the construction of a landscape.

B. Sub-grade Elevations: Excavation, filling, and grading required to establish elevations shown on drawings are not specified in this section. Subcontractors shall coordinate with contractor on responsibility for earthwork.

1.03 REFERENCES
A. General: Planting materials shall meet or exceed the Specifications of Federal, State, and Local laws requiring inspection for plant disease and insect control.

B. Plant material shall conform to the following documents, which are to be considered part of these Specifications:
1. "Standardized Plant Names," American Joint Committee on Horticultural Nomenclature, latest edition. Names of varieties not listed shall conform to names accepted by the nursery trade.
2. "American Standards for Nursery Stock," American Association of Nurserymen, Inc., latest edition.
3. "Grades and Standards for Nursery Plants," FL Dept. of Agriculture. Florida Nurserymen and Growers Association (FNGA).

1.04 QUALIFICATIONS
A. The landscape installation, maintenance, and warranty & replacement period shall be supervised by a person having not less than three (3) years experience supervising landscape construction.

1.05 INSPECTIONS
A. Inspections: All necessary state inspection certificates shall accompany the invoice for each shipment of plant materials. Contracting Officer reserves the right to reject, at any time or place, prior to final acceptance of the work, any or all of the plants, which fail to meet requirements of these specifications. Label each plant of each variety in each delivery with a securely attached waterproof tag bearing legible botanical name.

1.06 SUBMITTALS
A. Submittals: Provide the following samples:
1. Herbicide: Label from container or supplier's brochure.
2. Fill Sand: One-ounce sample of sand.
3. Soil Amendments: Labels from all bags.
4. Fertilizer: Labels from all bags.
5. Mulch: One-ounce sample.
6. Soil Test: Contractor will have existing soil tested by an approved soil laboratory. Results of test shall be forwarded to the Contracting Officer in accordance with Section 01410 of the specifications. The samples tested shall consist of a representative mixture from the site. Cost of the soil test shall be included in the base bid, but the cost of any soil amendment recommended by the laboratory shall be an additional charge to the government. Results of soil test shall provide data regarding:
   a. pH factor and corrective amendment recommendations
   b. Potassium, Phosphorus, Calcium, and Magnesium
   c. Required application rates of N-P-K and trace elements
   d. Nematode type and count
7. Watering Schedule per 3.09.D.
8. As-Built Drawings per 3.10 & Section 01700, CONTRACT CLOSEOUT.

B. Substitutions: The Contracting Officer in accordance with Section 01000 shall approve all substitutions.

1.07 JOB CONDITIONS

A. Basic Regulations: Planting operations shall be conducted under favorable weather conditions as determined by accepted horticultural practice. Contractor is hereby notified of active utilities and caution shall be exercised to avoid interruption of services. Contractor is responsible for replacement of any existing buried utilities, irrigation lines, etc., if they are broken during operations. Contractor shall have utilities mark the locations of their underground lines. Damaged utilities are to be replaced at the contractor's expense. When it is necessary to cross-paved areas, curbing or walks, the contractor shall provide protection against damage.

B. When conditions detrimental to plant growth are encountered during soil preparation or planting, such as rubble fill, poor drainage, toxic substances, or obstructions notify Contracting Officer and correct before planting.

C. Planting Sequence: Plant trees and shrubs after irrigation and final grades are established and prior to planting of lawns, unless otherwise acceptable to Contracting Officer. If planting of trees and shrubs occurs after lawn work, protect lawn areas and promptly repair damage to lawns resulting from planting operations.

1.08 WARRANTY & REPLACEMENT

A. Warranty trees, shrubs, and ground covers for a period of **one (1) year** following the date of final acceptance of the building to be alive and in vigorous health at the end of the warranty period. Plants damaged or killed as a result of hail, winds over 75 miles per hour, lightning, fire, winter kill caused by extreme cold and severe winter conditions not typical of the area, theft, vandalism, occupancy of the building, or government neglect of proper maintenance are not covered by the warranty.

B. Replacement: By the end of the guarantee period, any plant that is dead on thirty (30%) percent or more of the main branch structure or not in satisfactory condition as determined by the Contracting Officer, shall be removed from the site and replaced. All replacements shall be plants of the same kind and size as specified in the plant list and shall be furnished and planted as originally specified. Cost of replacements shall be borne by contractor. Replacement plants shall be guaranteed for one (1) year or as noted in the warranty. Replacement shall be made within 10 days after notification, or as soon as weather conditions allow.

PART 2 PRODUCTS

2.01 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Packaged Materials: Deliver packaged materials in original containers showing quantity, weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.

B. Trees and Shrubs: Do not prune prior to delivery unless otherwise approved by Contracting Officer. Do not bend or bind-tie trees or shrubs in such manner as to damage bark, break branches or destroy natural shape. Provide protective covering during delivery to prevent windburn. Do not drop plants during delivery. Handle all plant material by the root ball or container and never by the trunk, stems, or leaves.

C. Deliver plant materials after preparations for planting have been completed and plant immediately. Protect all plants from drying out. Use all means necessary to protect plant materials before, during and after installation and to protect the installed work and materials of all other trades. Do not remove container-grown stock from containers until planting time.

2.02 SOIL AMENDMENT

A. Fill Sand: Clean yellow fill, No. 4 to 200 Sand, pH 5.5 - 6.5, without weeds, rocks, shell, or weed seeds.

B. Soil Amendment for All Plants (See 3.03 A for ratios):
   1. Gro-Tone Bed Mix.
   2. Gel-Scape Polymer.
   3. Black Kow Composted Cow Manure.

2.03 PLANT MATERIALS

A. Plant Schedules: The quantity of plants calculated and shown on the plans defines only the general magnitude of plants required. Contractor shall furnish the number of plants required at the specified spacing to accomplish the planting.

B. All plants shall be nursery grown under climatic conditions similar to those in the locality of the project for a minimum of two years.

C. Provide "specimen" plants with a special height, shape or character of growth. Tag specimen trees or shrubs at the source of supply. The BCE will inspect photographs provided by the contractor of specimen selections for suitability to selected location.

D. Plants may be inspected and approved at the place of growth for compliance with requirements for quality, size and variety. Such approval shall not impair the right of inspection and rejection upon delivery at the site or during the progress of the work.

E. Label each plant of each variety in each delivery with a securely attached waterproof tag legibly bearing the botanical name.

F. Provide trees, shrubs, and ground covers of size, genus, species and variety shown and scheduled for landscape work as per the following:
   1. Provide plants graded FNGA #1 or better with normal, densely developed branches and vigorous, fibrous root systems. Provide only sound, healthy, vigorous plants free from defects, disfiguring knots, sunscald injuries, frost cracks, abrasion of the bark, plant diseases, insect eggs, borers, and all forms of infestation. All plants shall have a fully developed form without voids and open spaces. Plants shall be in a moist, vigorous condition, free from dead wood, bruises, or other root or branch injuries.
   2. Balled and burlapped plants shall have firm, natural root balls of sufficient diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of the plant. Provide ball sizes complying with the latest edition of the "American Standards for Nursery Stock". Cracked or mushroomed balls are not acceptable.

G. Container-grown stock: Grown in a container for sufficient length of time for the root system to have developed to hold its soil together, firm and whole. No plants shall be loose in the container. Container stock shall not be pot bound.

H. Provide tree species that mature at heights over 25' with a single main trunk. Trees that have the main trunk forming a "Y" shape are not acceptable.

I. Plants planted in rows shall be matched in form. Plants labeled as matched on the drawings shall be chosen for uniform height, spread and general character.

J. Plants larger than those specified in the plant list may be used at no additional cost to the government when acceptable to the Contracting Officer. If the use of larger plants is acceptable, increase the spread of roots or root ball in proportion to the size of the plant.

K. No pruning wounds shall be present with a diameter of more than 1" and such wounds must show vigorous bark on all edges.

L. Shrubs and small plants shall equal or exceed the requirements for spread and height indicated on the drawings.
   1. Measurements for height shall be taken from the top of the root ball to the average height of the top of the plant and not the longest branch.
   2. Single stemmed or thin plants will not be accepted.
   3. Side branches shall be generous, well twigged, and the plant as a whole full and bushy to the ground.

M. Bare root plants are not acceptable unless indicated as such.

N. Plant Substitutions: Permitted only upon submission of proof that the plant specified is not reasonably obtainable and approved by the Contracting Officer in accordance with Section 01000.

O. General Substitutions: The Contracting Officer in accordance with Section 01000 shall approve all substitutions.

2.04 MISCELLANEOUS LANDSCAPE MATERIALS

A. Dress Mulch: Longleaf pine straw freshly baled, dry, and free of debris, leaves, insects, and briars.

B. Water: Furnished by government or project irrigation system. Hose and other watering equipment to be provided by contractor.

C. Edging: Black Aluminum, 1/8" x 4" with stakes. Curve-Rite Aluminum Edging (800) 366-2878, or Sure-Loc (800) 787-3562, or PermaLoc (800) 356-9660 or approved equal.

D. Guying for Trees up to 3" cal.: Solid rubber guys with 24" galvanized stakes. Tree Saver Kits by Lawson &Lawson, Inc. (800) 833-5323, or approved equal. In loose soil provide 36" Pressure Treated 1" x 2" stakes with 1/2" hole drilled out for Guy.

E. Guying for Trees 3" cal. and over: Duckbill Earth Anchors (800) 325-5360 models 68 (for 3"-6" cal.) and 88 (for 6"-10" cal.) with white vinyl coating or approved equal. Size and install according to manufacturer's instructions.

F. Post-Emergent Herbicide: Round Up by Monsanto Corp., or approved equal.

G. Fertilizer (after Mulch is down): Osmocote 18 - 6 - 12 or approved equal.

H. Weed Control Fabric: Mirafi Mirascape weed barrier, soil separator and light drainage control; heat bonded nonwoven polypropylene landscape fabric.
   1. Substitutes: Products that meet the salient characteristics of the above product may be substituted in accordance with Section 01000.

PART 3 EXECUTION

3.01 WEED TREATMENT

A. All site locations where weeds or other undesirable vegetation exist shall receive an initial treatment of post-emergent herbicide. This treatment shall be repeated as required so that no weeds or undesirable vegetation are present at the final inspection of the Project and at the conclusion of the maintenance period.

B. Care shall be taken not to affect existing trees or shrubs to be saved on the site. Also care will be taken not to affect plants on adjacent site.

C. Mow grass and/or existing weeds in designated areas to 3" height.

D. Spray herbicide on a day that is not rainy and not windy or below 75 degrees F.

E. Do not disturb soil for 14 days.

F. After 14 days, the dead material shall be incorporated into the soil (only after completely dead) through rototilling.

3.02 SOIL PREPARATION AND BED LAYOUT

A. Contractor shall report to the Contracting Officer, immediately upon his awareness, any site condition or situation of the contiguous landscape that would cause flooding, washing or concentration of excess surface water to the areas receiving planting or lawn.

B. Prior to placement of any required soil amendment or fill sand, cultivate sub-grade to a minimum of four inches (4"). Remove stones over one-half inch diameter (1/2") and sticks, roots, rubbish and other extraneous debris of any dimension.

C. Soil Amendment and Fill Sand are to be placed to obtain uniform site grade and proper drainage. Compact to a minimum standard density of 80%.

D. Prior to fine grading install edging and stakes per manufacturer's instructions. Layout of edging is to be approved by the Contracting Officer. Straight runs are to be straight to within 1/2" and arcs are to be round to within 1/2" of plan dimensions. All Edging shall be truly square to other Edging or sidewalks, etc. where shown on plan.

E. Irrigation work shall be completed after rototilling and compaction, but prior to finish grading.

F. After the irrigation system is in place, the entire area shall be raked smooth after removing all rocks, roots and debris one-half inch (1/2") in diameter or larger. The site shall be free from irregular surface changes and shall vary uniformly between fixed elevations.

G. Fine grade grass areas to a smooth, even surface with loose, uniformly fine texture. Roll, rake and drag lawn areas, remove ridges and fill depressions, as required to meet finish grade. Limit fine grading to areas, which can be planted immediately after grading.

H. Allow for mulch thickness in shrub beds. Finish grade of soil shall be two inches (2") below top of pavement in all shrub areas.

3.03 PLANT MIXTURE

A. Mix specified soil amendment (see Section 2.02 A) for planting pits in the following ratio:
   1. One-Quarter (1/4) LB. of Bed Mix per Gallon (About One Heaping Handful)
   2. One-Quarter (1/4) OZ. of Polymer per Gallon for Container Grown Shrubs. One (1) OZ. of Polymer per Caliper Inch for Large Trees.
   3. One-Half (1/2) LB. of Cow Manure per Gallon (About Two Heaping Handfuls).

B. Before mixing, clean topsoil of roots, plants, sod, stones, lumps, existing irrigation materials, and other materials harmful or toxic to plant growth.

C. Contractor may be required to mix all ingredients of the planting soil mix in the presence of the Contracting Officer. All ingredients shall be thoroughly blended to provide a homogeneous mixture.

3.04 PREPARATION OF PLANTING BEDS

A. Contractor shall be responsible for soil preparation in the manner and to the depth detailed on the plans and specified. Finish grade of the soil preparation shall anticipate bed mulching and allow for depositing mulch below the grade of walks, curbs, etc., to minimize erosion.

B. Where existing trees are within planting beds, the bed preparation shall be done by hand to protect the tree roots.

C. Planting beds with weed growth shall be treated as necessary to remove weeds and re-inspected. No beds shall be accepted with weeds.

3.05 PREPARATION FOR SHRUB AND TREE PITS

A. Excavate pits with vertical sides and with bottom of pit slightly raised at center to provide drainage.

B. Shrubs, Multi Trunk Trees and Trees Under 2.5" Caliper: Minimum depth allows root balls (containers) to sit on six inches (6") of compacted planting mixture with top of ball (container) flush with finish soil grade. Minimum diameter of pit is twice the diameter of root ball.

C. Trees 2.5" Caliper and Over: Minimum depth allows root balls to sit on pit bottom with top of ball flush with finish soil grade or top of ball three inches (3") above finish soil grade. Minimum diameter of pit is twice the diameter of the rootball.

D. Utilize excavated parent soil in the backfill mixture in the planting pit for trees. The parent soil is to be mixed with the soil amendment specified in 3.03A.

E. Where tree pits are dug in clay, a four-inch (4") diameter drainage hole will be drilled and backfilled with gravel to insure proper drainage. The drain hole must be able to drain the pit filled with water within a 24-hour period of time. Additional drain holes shall be drilled if required to pass this test. Prior to planting tree place soil separation fabric over drainage holes.

3.06 PLANTING

A. Layout individual tree, shrub and planting bed areas for plantings. Stake tree locations and outline planting bed areas. Contracting Officer reserves the right to inspect all layouts prior to the start of and during planting work. Make adjustments as requested.

B. Space ground cover in accordance with indicated dimensions. Adjust spacing as necessary to evenly fill planting bed with indicated quantity of plants. Plant to within twelve (12") of the trunks of trees and shrubs within planting bed and to within six inches (6") of edge of bed.

C. Remove plant from container in such a way so as to not damage stem or plant. **Scarify sides and bottom of root ball** with a 3-pronged hand cultivator, without damaging plant, so that roots are free to expand outward and downward. BCE reserves the right to spot-check root balls by pulling them out of the ground. If any root balls are found to be unscarified then the Contracting Officer may require that all plants be pulled up and replanted.

D. In a five-gallon bucket or wheelbarrow, hydrate the polymer for 30 minutes minimum. Dip all 3 gallon plants and smaller in the slurry and ensure that the polymer is attached to the roots before planting.

E. Set plant material in the planting pit to proper grade and alignment. Set plants upright, plumb, and faced to give the best appearance or relationship to each other or adjacent structure. No filling will be permitted directly around trunks or stems. Backfill the pit with planting mixture described in 3.04A and **compact to 85% so that there are no air pockets. Use water from a hose to settle planting soil (backfill) as it is shoveled into the hole for #3 and larger shrubs and all trees.** Do not use frozen or clay-like mixtures for backfilling.

F. All plant material shall be set at a level that, after settlement, they shall bear the same relationship to the finish grade that they bore to the soil from which they were dug or container they were grown in.

G. Build 4" watering saucers for #7 and larger trees, otherwise planting beds shall be raked smooth and watered and then allowed to soak away.

H. After settlement, add planting soil as necessary to bring bed to finish grade and again thoroughly water entire plant bed.

I. Remove all burlap, ropes, tags and wires from the top of balls, stems, and branches of plants.

J. Prune, thin out, and shape shrubs in accordance with Standard Horticultural Practice if deemed necessary by contracting Officer. Prune shrubs to retain natural character. Pruning shall be limited to the minimum necessary to remove injured twigs and branches and to compensate for the loss of roots during transplanting, but never to exceed one half (1/2) of the branching structure.

K. Guy all trees #15 and larger immediately after planting, as indicated. Under no circumstances is a tree to be plumbed with extreme tautness of guy wires. Install per manufacturer's instructions.

3.07 MULCHING

A. Dress Mulching: Within two days after planting place not less than three (3) inches **(after settlement)** of mulch on entire area of planting beds, and not less than four (4) inches over shrub and tree pits.

B. Tuck mulch in at edge of beds with a round-point shovel so that mulch is pushed into soil and is kept in beds.

C. The completed sod will be inspected at the time of the final inspection. Sod will also be inspected at the end of the 60-day maintenance period.

D. Where inspected landscape work does not comply with requirements, replace rejected work and continue specified maintenance until re-inspected and found to be acceptable. Remove rejected and materials promptly from the project site.

3.08 FERTILIZATION

A. 1 Tablespoon per Gallon of plant size after mulch is down. Do not place against stem or leaves of plants. See 2.04 G for type.

3.09 MAINTENANCE

A. Begin maintenance immediately after each plant is planted and continue for **ninety (90) days** after final acceptance of the project.

B. Maintain newly planted trees, shrubs and other plants by pruning, removal of dead wood, fertilizing, cultivating, watering, weeding, and mulching as required for normal, healthy growth. Restore planting

saucers. Tighten and repair stake and guy supports and reset trees and shrubs to proper grades or vertical position as required. Spray as required to keep trees and shrubs free of insects and disease.

C. Maintenance Instructions: Submit typewritten instructions recommending procedures to be established by the Contracting Officer for the landscape maintenance over the first year. Instructions shall present maintenance procedures/activities to be implemented over a one-year period on a month-by-month basis.

D. Watering Schedule: Watering schedule is to include the duration and frequency each irrigation zone will run per week. This will be worked out jointly with the Landscape Irrigation Contractor and shall be programmed on to the controller after review by BCE. Program shall be submitted to BCE as part of the final acceptance process.

3.10 RECORD DRAWINGS

A. Contractor shall keep up-to-date, a complete "as-built" record set of blueline prints, corrected daily, showing any change from the original plans in red ink. Identify field changes of dimension and detail and any changes made by Change Order. Also see Section 01700, CONTRACT CLOSEOUT.

3.11 CLEANUP AND PROTECTION

A. During landscape work, all rope, wire, burlap, empty containers, pallets, rocks, clods and other debris, shall be removed daily and the site kept neat at all times.

B. Any excess subsoil or topsoil shall be removed from the site.

C. After planting operations are finished, all paved areas which may have become strewn with soil or other material shall be thoroughly cleaned by sweeping or blowing and, if necessary, power washing.

D. Protect landscape work and materials from damage due to landscape operations, operations by other contractors, trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged landscape work as directed.

3.12 INSPECTION AND ACCEPTANCE

A. The completed landscaping will be inspected at the time of the final inspection. Landscaping will also be inspected at the end of the 90-day maintenance period.

B. Where inspected landscape work does not comply with requirements, replace rejected work and continue specified maintenance until re-inspected and found to be acceptable. Remove rejected and materials promptly from the project site.

END OF SECTION

SECTION 02952 TREATMENT OF EXISTING TREES

PART 1 GENERAL

1.01 RELATED SPECIFICATION SECTIONS:

A. Section 01000 – GENERAL REQUIREMENTS

1.02 DESCRIPTION OF WORK

A. The work consists of pruning and protection of existing trees and vegetation including, but not limited to: shrubs, ground covers, wetlands, and endangered species. The work includes the furnishing of all labor, equipment, supplies, transportation, materials, and operations as required.

B. Contractor shall coordinate with the Project Inspector for extent of work and shall protect trees and vegetation per Part 3.

1.03 QUALIFICATIONS

A. Employ certified arborist for pruning.

B. Arborist shall have the following minimum certifications:
   1. Member, National Arborist Association
   2. Member, International Society of Arborists

1.04 JOB CONDITIONS

A. Inspection: After layout of the improvements is accomplished, contractor and arborist shall review impact of new construction and need for pruning. Submit arborist report to the Contracting Officer outlining extent of pruning recommended by the arborist.

B. Liability: Contractor is liable for all damage to existing trees and vegetation damaged during the construction period until final acceptance of the project. The arborist will inspect any trees damaged during the construction period and an appraisal made of the damages. The contractor will be assessed damages as the Contracting Officer decides.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PROTECTION FOR EXISTING TREES TO BE SAVED

A. Do not compact soil under the drip line of the trees. No debris or stockpiles shall be placed within the drip line of the trees. No large machinery shall be operated or parked within the drip line of the trees.

B. Where contaminates are present protect trees by placing a 6 mil. plastic film barrier on top of existing soil and under the drip line of trees. Leave film in place until contaminates no longer endanger trees.

C. Protect existing trees indicated to remain in place, against unnecessary cutting, breaking or skinning of roots or trunk, and vehicular traffic.

D. Repair or replace trees and vegetation to remain. Damaged trees shall be repaired or replaced as recommended by the Arborist and approved by the Contracting Officer.

E. Employ certified arborist to repair damaged trees and shrubs if directed.

F. Water trees and other vegetation to remain within limits of contract work as required to maintain their health during course of construction operations.

G. Provide protection for roots over two (2) inches in diameter that are cut during construction operations. Coat cut faces with emulsified asphalt or other acceptable coating formulated to use on damaged plant

tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out; cover with earth as soon as possible.

H. Replace trees that are damaged during construction and cannot be repaired and restored to full-growth status, as determined by arborist.

3.02 SITE CLEARING

A. Cordon off existing trees and vegetation to be saved with temporary construction fencing before start of work.

B. Carefully and cleanly cut roots and branches of trees (so as not to fray) indicated to be left standing, where such roots and branches obstruct new construction. Under no circumstances will cutting of roots over two (2) inches in diameter or any branches be done by anyone except a certified arborist and with the approval of the Contracting Officer.

C. Limit of clearing shall be within the limits of construction lines except as otherwise shown. Damage outside these limits caused by the Contractor's operation shall be corrected at the Contractor's expense.

D. Completely remove stumps, roots, and other debris to a depth of not less than two (2) feet below existing grade.

E. Use only hand methods for grubbing inside drip line of trees.

3.03 PRUNING

A. Pruning shall consist of the removal of dead, dying, diseased and interfering, objectionable, and weak branches as follows:

B. Class I Fine Pruning (National Arborist Association Classification):

C. Fine pruning shall consist of the removal of the described branches on the main trunk and limbs inside the leaf area and any that extend beyond this area. The described branches to 1/2" (size of dime) diameter may remain within the main leaf area to their full length.
   1. All cuts are to be made sufficiently close to the parent stem so that healing can readily start under normal conditions.
   2. All limbs one inch in diameter (size of quarter) or over must be precut to prevent splitting. All branches 3-1/2" in diameter or over should be lowered to the ground with proper sized ropes.
   3. Remove one or all crossed or rubbing branches where practicable so that the removal will not leave holes in general outline of the tree.
   4. Trees known to be diseased and where there is danger of transmitting that disease, tools are to be disinfected with alcohol after each cut and between trees.
   5. Old scars not healing properly (where callus growth is not already established) are to be traced and painted, unless other treatment is designated.
   6. All girdling roots visible to the eye, where practicable, should be treated as follows: cutting root at either end; notching of root in center with chisel; removing entire root without injury to bark or parent stem.
   7. Any structural weakness, decayed trunk or branches, split crotches or branches shall be reported.
   8. No major limbs or structure will be cut or removed without prior approval of the arborist and Contracting Officer.

END OF SECTION

SECTION 03100: CONCRETE FORMWORK

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.

B. Openings for other work.

C. Form accessories.

D. Form stripping.

1.02 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION
A. See applicable section of the specifications.

1.03 REFERENCES
A. ACI 301 - Specification for Structural Concrete for Buildings.

B. ACI 318 - Building Code Requirements for Reinforced Concrete.

C. ACI 347 - Recommended Practice For Concrete Formwork.

D. PS-1 - Construction and Industrial Plywood.

1.04 DESIGN REQUIREMENTS
A. Design, engineer and construct formwork, shoring and bracing to conform to code requirements; resultant concrete to conform to required shape, line and dimension.

1.05 SUBMITTALS
A. Submit under provisions of Section 01300.

B. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties.

1.06 QUALITY ASSURANCE
A. Perform Work in accordance with ACI 318.

B. Maintain one copy of each document on site.

1.07 QUALIFICATIONS
A. Design formwork under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Florida.

1.08 REGULATORY REQUIREMENTS
A. Conform to applicable code for design, fabrication, erection and removal of formwork.

1.09 DELIVERY, STORAGE, AND HANDLING
A. Deliver, store, protect and handle products to site under provisions of Section 01600.

B. Store off ground in ventilated and protected manner to prevent deterioration from moisture.

1.10 COORDINATION
A. Coordinate this section with other sections of work, which require attachment of components to formwork.

B. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement, request instructions from the Contracting Officer before proceeding.

PART 2 PRODUCTS

2.01 WOOD FORM MATERIALS

A. Softwood Plywood: PS 1, C Grade.

2.02 FORMWORK ACCESSORIES

A. Form Ties: Snap-off type, galvanized metal, adjustable length, 1 inch back break dimension, free of defects that could leave holes larger than I inch in concrete surface.

B. Form Release Agent: Colorless mineral oil, which will not stain concrete, or absorb moisture.

C. Corners: Chamfered type, 3/4 inch x 3/4 inch size.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with Drawings.

3.02 EARTH FORMS

A. Earth forms are not permitted.

3.03 ERECTION - FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.

B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

D. Align joints and make watertight. Keep form joints to a minimum.

E. Obtain approval before framing openings in structural members, which are not indicated on Drawings.

F. Provide chamfer strips on exposed external corners of concrete edge.

3.04 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

C. Do not apply form release agent where concrete surfaces will receive special finishes, which are effected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.05 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for items to be embedded in or passing through concrete work.

B. Locate and set in place items which will be cast directly into concrete.

C. Coordinate work of other Sections in forming and placing openings, slots, reglets, recesses. chases, sleeves, bolts. anchors, and other inserts.

D. Install accessories in accordance with manufacturer's instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.

3.06 FORM CLEANING

A. Clean and remove foreign matter within forms as erection proceeds.

B. Clean formed cavities of debris prior to placing concrete.

C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

D. During cold weather, remove ice from within forms. Do not use de-icing salts or water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.07 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 301.

3.08 FIELD QUALITY CONTROL

A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.

B. Do not reuse wood formwork more than 2 times for concrete surfaces to be exposed to view. Do not patch formwork.

3.09 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

END OF SECTION

SECTION 03200: CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Reinforcing steel bars, wire fabric and accessories for cast in place concrete.

1.02 REFERENCES
A. ACI 318 - Building Code Requirements For Reinforced Concrete.

B. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.

C. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.

D. CRSI - Concrete Reinforcing Steel Institute Manual of Practice.

E. CRSI 63 - Recommended Practice For Placing Reinforcing Bars.

F. CRSI 65 - Recommended Practice For Placing Bar Supports, Specifications and Nomenclature.

1.03 SUBMITTALS
A. Submit under provisions of Section 01300.

B. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and wire fabric, bending and cutting schedules, and supporting and spacing devices and anchor bolt layout.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.04 QUALITY ASSURANCE
A. Perform Work in accordance with CRSI 63, 65 and Manual of Practice.

B. Maintain one copy of each document on site.

C. Submit certified copies of mill test report of reinforcement materials analysis.

1.05 COORDINATION
A. Coordinate with placement of formwork, formed openings and other Work.

PART 2 PRODUCTS

2.01 REINFORCEMENT
A. Reinforcing Steel:
   1. ASTM A615, 60-ksi yield grade
   2. Deformed billet steel bars.

B. Welded Steel Wire Fabric: ASTM A185 Plain Type; in flat sheets or coiled rolls; plain finish.

2.02 ACCESSORY MATERIALS
A. Tie Wire: Minimum 16 gauge annealed type.

B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture. Brick or CMU may not be used for support except as permitted in paragraph 1.02 above.

2.03 FABRICATION
A. Fabricate concrete reinforcing in accordance with ACI 318.

PART 3 EXECUTION

3.01 PLACEMENT

A. Place, support and secure reinforcement against displacement. Do not deviate from required position.

B. Do not displace or damage vapor barrier.

C. Accommodate placement of formed openings.

D. Conform to ACI 318 for concrete cover over reinforcement.

3.02 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01410.

END OF SECTION

SECTION 03251: CONSTRUCTION, ISOLATION AND CONTRACTION JOINTS

PART 1 GENERAL

1.01 RELATED SPECIFICATION SECTIONS:
A. Section 01000 – GENERAL REQUIREMENTS

1.02 WORK INCLUDED
A. Forming integral isolation and contraction joints in concrete.

B. Visually concealing expansion joints in concrete.

C. Isolation and contraction joint devices associated with concrete work, including joint sealant.

1.03 REFERENCES
A. ANSI/ASTM D994 - Preformed Expansion Joint Filler for Concrete (Bituminous Type).

1.04 SUBMITTALS
A. Provide 12-inch long sample of expansion joint and control joint under provisions of Section 01300.

B. Submit manufacturer's installation instructions under provisions of Section 01300.

PART 2 PRODUCTS

2.01 JOINT TYPES, DEVICES AND FILLER MATERIALS
A. Isolation Joint Filler Type A: ASTM D994: Asphalt impregnated glass fiber, minimum 1/2" inch thick or as indicated on drawings.

B. Exterior Construction Joint Devices: Integral galvanized steel, formed to tongue and groove profile, with removable top strip exposing sealant trough, and ribbed steel spikes with tongue to fit top screed edge.

C. Interior Construction Joint Devices: Integral galvanized steel, formed to tongue and groove profile, with ribbed steel spikes with tongue to fit top screed edge.

D. Contraction Joint: Joint that is saw cut into the surface of the concrete as soon as the concrete has hardened sufficiently to prevent aggregates from becoming dislodged by the cutting process (usually 4-12 hours after the concrete hardens) and completed before drying shrinkage causes cracking. Initial cut shall be 1/3 the thickness of the slab. After concrete has cured, joints shall be re-cut to ½" width x ½" depth. Provide foam backer rod and fill joint with sealant flush with top of slab.

E. All joint material shall match the thickness of the slab.

F. Sealant: ASTM D1190: Hot applied synthetic rubber compound.

G. Sealant: Cold applied two-part liquid neoprene.

PART 3 EXECUTION

3.01 INSTALLATION
A. Locate and form construction, isolation and contraction joints.

B. Place formed construction and isolation joints in floor slab pattern placement sequence. Set top screed to required elevations. Secure to resist movement of wet concrete.

C. Install joint fillers and sealants in accordance with manufacturer's instructions. Use primers of type recommended by joint filler and sealant manufacturer.

D. Saw-cut contraction joints as per above.

END OF SECTION

SECTION 03300 CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 RELATED SPECIFICATION SECTIONS:
A. Section 01000 – GENERAL REQUIREMENTS

1.02 SECTION INCLUDES
A. Slabs on grade including integral footings, beams, columns, and elevated floor and roof slabs.

B. Equipment pads and thrust blocks.

1.03 REFERENCES
A. ACI 301 - Structural Concrete for Buildings.

B. ACI 302 - Guide for Concrete Floor and Slab Construction.

C. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

D. ACI 305R - Hot Weather Concreting.

E. ACI 306R - Cold Weather Concreting.

F. ACI 308 - Standard Practice for Curing Concrete.

G. ACI 318 Building Code Requirements for Reinforced Concrete.

H. ASTM C33 - Concrete Aggregates.

I. ASTM C94 - Ready-Mixed Concrete.

J. ASTM C150 - Portland Cement.

K. ASTM C260 - Air Entraining Admixtures for Concrete.

L. ASTM C494 - Chemicals Admixtures for Concrete.

M. ASTM C618 - Fly Ash and Raw or Calcinated Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.

N. ASTM E1745-97 Standard Specifications for Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.

1.04 SUBMITTALS
A. Submit under provisions of Section 01300.

B. Product Data: Provide data on joint devices, sealants, attachment accessories and admixtures.

C. Concrete mix design.

1.05 PROJECT RECORD DOCUMENTS
A. Accurately record actual locations of embedded utilities and components, which are concealed from view.

1.06 QUALITY ASSURANCE
A. Perform Work in accordance with ACI 301.

B. Maintain one copy of each document on site.

C. Acquire cement and aggregate from same source for all work.

D. Conform to ACI 305R when concreting during hot weather.

E. Conform to ACI 306R when concreting during cold weather.

1.07 FIELD SAMPLES

A. Provide under provisions of Section 01410. Coordinate with Section 03100.

1.08 COORDINATION

A. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

A. Cement: ASTM C150, Type I - Normal or Type III - High Early Strength Portland type.

B. Fine and Coarse Aggregates: ASTM C33. Course aggregate shall be washed and shall consist of crushed stone. Particle shape of coarse shall be generally cubicle in shape.

C. Water: Clean and not detrimental to concrete.

2.02 ADMIXTURES

A. Air Entrainment: ASTM C260.

B. Chemical: ASTM C494, Type D - Water Reducing and Retarding or Type E - Water Reducing and Accelerating Admixture.

C. Fly Ash: ASTM C618. Type C or Type F (Loss on ignition for type F shall not exceed 6%). **If an approved pozzolanic material is used, the weight of flyash used shall not exceed 10% determined by dividing the weight of flyash by the weight of Portland cement.**

D. Use of all admixtures must be approved by the Contracting Officer. The use of 'plastisizers' is prohibited unless approved by the Contracting Officer.

2.03 ACCESSORIES

A. Bonding Agent: Polymer resin emulsion or two component modified epoxy resin.

B. Vapor Barrier: ASTM E1745-97, Class "B" reinforced, multi-ply vapor retarder (Water vapor resistance 0.3 perms, Tensile strength 30.0 lbf/in, Puncture resistance 1700 grams). Install in strict compliance with manufacturer's written instructions including filed taping of seams and installation of pipe boots penetrating through the slab.

C. Non-shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.

2.04 JOINT TYPES, DEVICES AND FILLER MATERIALS

A. See Section 03251 CONSTRUCTION, ISOLATION AND CONTRACTION JOINTS

2.05 CONCRETE MIX

A. Mix concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM C94.

B. Use accelerating admixtures in cold weather only when approved by Contracting Officer. Use of admixtures will not relax cold weather placement requirements.

C. Accelerating admixtures shall not contain more than 0.1% calcium chloride.

D. Use set retarding admixtures during hot weather only when approved by Contracting Officer.

E. Add air entraining agent to normal weight concrete mix for work exposed to exterior.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify site conditions.

B. Verify requirements for concrete cover over reinforcement.

C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

3.02 PREPARATION

A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

3.03 SCHEDULE - JOINT CONTROL

A. Floor Slab Perimeter and Exterior/Interior Isolation Joints: Joint filler Type A set 1/8 inch below floor slab elevation.

B. Exterior/Interior Construction Joints: Set joints to line and grade.

C. Contraction Joints: Saw-cut joints to dimensions shown on the drawings.

D. See 2.04.A above and specification section 03251.

3.04 PLACING CONCRETE

A. Place concrete in accordance with ACI 318.

B. Notify Contracting Officer minimum 24 hours prior to commencement of operations.

C. Ensure reinforcement, inserts, embedded parts, formed joint fillers and joint devices are not disturbed during concrete placement.

D. Install vapor barrier under interior slabs on grade. Lap joints minimum 8 inches and seal watertight by taping edges and ends.

E. Repair vapor barrier damaged during placement of concrete reinforcing. Repair with vapor barrier material; lap over damaged areas minimum 8 inches and seal watertight.

F. Install joint fillers, primer and sealant in accordance with manufacturer's instructions.

G. Install construction joint device in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

H. Install joint device anchors. Maintain correct position to allow joint cover flush with floor finish.

I. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

J. Place concrete continuously between predetermined expansion, control, and construction joints.

K. Saw cut joints using 3/16-inch thick blade. Depth of cut shall not be less than one-third (1/3) the thickness of the slab.

L. Screed floors and slabs on grade level, maintaining surface flatness of maximum 1/4 inch in 10 feet.

3.05 CONCRETE TYPES AND FINISHING

A. Finish concrete floor surfaces in accordance with ACI 301.

B. Monolithic Foundation and Slab-on-Grade: 3,000 psi 28 day concrete, formed to line and grade. Steel trowel finishes surface of slab. Vertical surfaces shall be repaired/patched and finished no later than one day after form removal. Wet and rub surface with a carborundum brick or other approved abrasive,

producing a satisfactory finish, smooth and uniform in color and texture. Seal all joints with an approved joint sealer.

C. Beams, Columns, Elevated Floor and Roof Slabs Exposed to View: 4,000 psi 28 day concrete. Patch/repair surfaces after form removal, wet and rub surface with a carborundum brick or other approved abrasive after patching/repair, producing a satisfactory finish, smooth and uniform in color and texture.

D. Exposed Exterior Sidewalks, Aprons, Landings, Steps: 3,000 psi 28 day concrete, air entrained, and non-slip broom finish.

E. Below Grade Footings, Single-Story Structures: 3,000 psi 28 day concrete, form finish.

F. Below Grade Footings, Multi-Story Structures: 4,000 psi 28 day concrete, form finish.

3.06 CURING AND PROTECTION

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

C. Cure concrete floor surfaces to requirements of Section 03370.

3.07 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed in accordance with ACI 301 and under provisions of Section 01410.

B. Provide free access to work and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to testing firm for review and approval prior to commencement of work.

D. Tests of cement and aggregates may be performed to ensure conformance with specified requirements.

E. Three concrete test cylinders will be taken for every 40 or less cubic yards of each class of concrete placed. Perform one compression test each at 7 days and 28 days, and one spare to be tested when directed by Contracting Officer.

F. One slump test will be taken for each set of test cylinders taken. Slump shall be within 3"-5" range except monolithic foundation and slab-on-grade shall be within 2"-4" range.

3.08 PATCHING

A. Allow Contracting Officer to inspect concrete surfaces immediately upon removal of forms.

B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Contracting Officer upon discovery.

C. Patch imperfections as directed in accordance with ACI 301.

3.09 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements. Concrete not conforming to specified strength in 28 days will be considered defective.

B. Defective concrete will be **removed and replaced**. Removal will be to the nearest construction joint in all directions. Repair of defective concrete will be permitted only upon approval from the Contracting Officer.

C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Contracting Officer for each individual area.

END OF SECTION

SECTION 03370: CONCRETE CURING

PART 1 GENERAL

1.01 RELATED SPECIFICATION SECTIONS:
A. Section 01000 – GENERAL REQUIREMENTS

1.02 SECTION INCLUDES
A. Initial and final curing of horizontal and vertical concrete surfaces.

1.03 REFERENCES
A. ACI 301 - Structural Concrete for Buildings.

B. ACI 308 - Standard Practice for Curing Concrete.

C. ASTM C171 - Sheet Materials for Curing Concrete.

D. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.

1.04 SUBMITTALS
A. Submit under provisions of Section 01300.

B. Product Data: Provide data on curing compounds, product characteristics, compatibility and limitations.

C. Manufacturer's Installation Instructions: Indicate criteria for preparation and application.

1.05 QUALITY ASSURANCE
A. Perform Work in accordance with ACI 301.

B. Maintain one copy of document on site.

1.06 DELIVERY, STORAGE, AND HANDLING
A. Deliver, store, protect and handle products under provisions of Section 01600.

B. Deliver curing materials in manufacturer's packaging including application instructions.

PART 2 PRODUCTS

2.01 MATERIALS
A. Membrane Curing Compound Type A: ASTM C309, Type I, Class B, acrylic type, clear without fugitive dye; ASTM C309, white pigmented Type 2, Class B, free of paraffin.

B. Absorptive Mats Type B: ASTM C171.

C. Waterproof Paper Type C: ASTM C171, treated to prevent separation during handling and placing, standard color.

D. Polyethelene Film Type D: ACTM C171, 6 mil. thick, clear.

E. Water: Potable and not detrimental to concrete.

PART 3 EXECUTION

3.01 EXAMINATION
A. Verify that substrate surfaces are ready to be cured.

3.02 EXECUTION - HORIZONTAL SURFACES
A. Cure floor surfaces in accordance with ACI 308.

B. Membrane Curing Compound @ Exterior Exposed Concrete Only: Apply curing compound in accordance with manufacturer's instructions in 2 coats with second coat at right angles to first.

C. **All Floor Slabs shall be cured with Polyethylene Film** (Optional for other horizontal surfaces): Spread polyethylene film over floor slab areas, lapping edges and sides and sealing with pressure sensitive tape; maintain in place for 7 days. Other wet-cure methods may be used if approved by the Contracting Officer.

3.03 PROTECTION OF FINISHED WORK

A. Do not permit traffic over unprotected floor surface.

END OF SECTION

SECTION 03732 CONCRETE REPAIR

PART 1 GENERAL

1.01 RELATED SPECIFICATION SECTIONS
A. Section 01000 - GENERAL REQUIREMENTS

1.02 SUMMARY
A. This section includes work involved with preparation of concrete and application of repair materials, and restoration of concrete surfaces.

1.03 REFERENCES
A. Specific criteria as provided herein:
   1. ANSI American National Standards Institute
   2. ASTM American Society for Testing of Materials

1.04 SUBMITTALS
A. Submit product data under provisions of Section 01300.

B. Submit product data indicating product standards, physical and chemical characteristics, technical specifications, limitations, maintenance instructions, and general recommendations regarding each material.

C. Submit manufacturer's installation instructions under provisions of Section 01300.

D. Submit manufacturer's certificate under provisions of Section 01400 that specified products meet or exceed specified requirements.

1.05 MEASUREMENT
A. Measurement of materials shall be by the surface area of material provided for pavement construction, as measured in square yards. This measurement is independent of the depth of material and is only for work that is fully acceptable to the contracting officer.

1.06 PROJECT RECORD DOCUMENTS
A. Submit documents under provisions of Section 01700.

1.07 QUALITY ASSURANCE
A. Materials Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years experience.

B. Applicator: Company specializing in concrete repair with minimum 3 years experience.

1.08 MOCKUP - Not Used.

1.09 DELIVERY, STORAGE, AND HANDLING
A. Deliver products to site under provisions of Section 01600.

B. Store and protect products under provisions of Section 01600.

C. Comply with instructions for storage, shelf life limitations, and handling.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS
A. Epoxy Resin: Two-part epoxy adhesive containing 100 percent solids, meeting the following minimum characteristics:

Characteristic	Test Method	Results
Bond Strength	ANSI/ASTM C882	2,700 psi

Tensile Strength	ASTM D638	6,600 psi
Elongation	ASTM D638	2 % at 7 days at 70° F (21° C)
Flexural Strength	ASTM D790	8,000 psi
Compressive Strength	ASTM D695	6,500 psi

B. Bonding Agent: Polyvinyl acetate emulsion, dispersed in water while mixing, non-coagulant in mix, water resistant when cured.

C. Portland Cement: ASTM C150, Type III; color as selected

D. Sand: ANSI/ASTM C404; uniformly graded, clean.

E. Water: Clean and potable.

F. Cleaning Agent: Commercial muriatic acid.

2.02 REINFORCEMENT MATERIALS - Not Used.

2.03 MIXING EPOXY MORTARS

A. Mix epoxy mortars in accordance with manufacturer's instructions for purpose intended.

B. Mix components in clean equipment or containers. Conform to pot life and workability limits.

2.04 MIXING CEMENTITIOUS MATERIALS

A. Mix cementitious grout in accordance with manufacturer's instructions for purpose intended.

B. Include bonding agent as additive to mix.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work.

B. Beginning of installation means installer accepts existing surfaces.

3.02 PREPARATION

A. Clean concrete surfaces of dirt, laitance, corrosion, or other contamination; wire brush using water. Rinse surface and allow to dry.

B. Flush out cracks and voids with water to remove laitance and dirt.

C. Provide temporary entry ports spaced to accomplish movement of fluids between ports, no deeper than the depth of the crack to be filled. Limit port size diameter to be no greater than the thickness of the crack. Provide temporary seal at concrete surface to prevent leakage of adhesive.

D. For areas patched with epoxy mortar, remove broken and soft concrete 1/4-inch deep. Remove corrosion from steel. Clean surfaces mechanically; wash with acid and rinse with water.

E. Sandblast, clean the exposed reinforcement steel surfaces. Mechanically cut away damaged portions of bar.

3.03 REPAIR WORK

A. Repair spalling. All spalled concrete areas identified for repair shall be saw cut a minimum of 3" deep at a distance at least 2" beyond the spalled area (into, uncracked concrete) or shall be cut and repaired as shown on the applicable drawings. Apply surface finish to match the existing and surrounding pavement.

3.04 INJECTION - EPOXY RESIN ADHESIVE

A. Inject adhesive into prepared ports under pressure using equipment appropriate for particular application.

B. Begin injection at lower entry port and continue until adhesive appears in adjacent entry port. Continue from port to port until entire crack is filled.

C. Remove temporary seal and excessive adhesive.

D. Clean surfaces adjacent to repair and blend finish.

3.05 APPLICATION - EPOXY MORTAR

A. Trowel apply mortar mix. Tamp into place filling voids at spalled areas.

B. For patching honeycomb, trowel mortar onto surface, working into honeycomb to bring surface flush with surrounding area. Finish trowel surface to match surrounding area.

C. Cover exposed steel reinforcement with epoxy mortar; feather edges to flush surface.

3.06 APPLICATION CEMENTITIOUS GROUT

A. Apply coating of bonding agent to concrete surfaces. Provide full surface coverage.

B. Apply cementitious grout by steel trowel. Tamp into place filling voids at spalled areas. Work mix into honeycomb.

C. Damp cure cementitious grout for four days.

END OF SECTION